The S.A.E. Production Meeting

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Production Progress in 1924—

1. Making General Tools Do Special Jobs
2. Speeding Up Operations in Paint Shop

By W. L. Carver

ALTHOUGH production figures for 1924 are somewhat behind those of the previous year, the development of new methods and machines has not been allowed to lag, but on the contrary, has been carried forward with considerable energy. On the one hand, most of the production departments of the industry have had enforced breathing spells of varying length, and, therefore have had opportunity to overhaul some of their methods, with the idea of cutting down labor costs and utilizing floor space to better advantage. On the other hand, machine tool builders almost without exception are following more closely the trends in automotive production and are constantly developing tools that help to solve both labor and equipment problems. One of the most important developments has been the production and installation of machines which are virtually standard general purpose machines but equipped with highly developed control and feed mechanisms which make them the equal in production work of the passing specialized machine.

In the past, when production was mentioned in automotive circles, reference was generally had to the machine shop. Production discussions centered around high speed steel, cutting oil, chips and wiping rags. The body shop was an orphan and, like most orphans, "just grew." During the past year this condition has been changed to a large extent. Not only the firms specializing in the manufacture of bodies but also many of the car manufacturers have entirely revamped their practice, and the modern body shop bears little resemblance to its forerunner of three or four years ago. With this improvement in fabricating practice has come an even more striking change in finishing methods, and the body department today ranks with the machine shop in progressiveness. Pyroxylin finishes have eliminated much of the grief of the older methods and, not to be outdone, some of the varnish makers have simplified and at the same time, improved their finishes.

By this time the lesson of the war-time boom seems to have been fully learned and buyers and builders of machine tools are reverting to the simpler types of machine. It is not to be inferred that machines themselves are becoming simpler, but rather that the function of the machine is being simplified. One machine performs one function on parts having a broad range of sizes, or the tools may be changed and the same machine applied to another set of parts. As the range of operations is widened, some additional complexity is bound to enter into the design, but machine tool builders have adopted improved systems of lubrication, advanced bearing lay-outs and substantial construction.

Cyclic operation has come to the front more and more, so that machines of this type are available now for practically every class of machine work. Many of these are specialized machines which are built around a certain class of production work. As examples of this class which have been introduced within the past year may be cited, The Meldrum-Gabrielson Production Unit for boring, drilling and formed cutter work, the Lodge & Shipley Duo-matic for turning and facing operations and Lees-Bradner's new gear hobber for spur gear cutting. These later Mult-Au-Matic and Contin-U-Matic, the Gisholt's Simpli-Matic and the earlier screw machines. The Fox Machine Company has a cam-operated drill press for multiple drilling, spot-facing or counter-boring. Fitchburg equips one model of its Lo-Swing Lathe with a cyclic control for shaft turning. The Fay and Hartness automatics handle wide ranges of center and chucking work.

In the milling machine field practically every

builder of standard machines has adopted some system of selective control which permits cyclic operation. Cincinnati, Kearney & Trecker (in their Milwaukee line) and Brown & Sharpe build various lines of machines equipped with selective stops and variable feed mechanisms. The fixture is loaded and the control tripped; the selective control then advances the table to the cutters at a high rate of speed, slows it down to the proper cutting speed and then after the cut is completed, returns it to the original position. In many installations the automatic travel of the table is utilized to index fixtures, so that the operator is only concerned in loading and starting the machine.

In the grinder field, the centerless type, which has the advantage of practically continuous operation, is being adopted more generally for plain cylindrical work, and engineers are paying greater attention to the design of parts in order to utilize this feature to the greatest extent. Shouldered parts, such as valve tappets, etc., are also handled on these machines with additional stop equipment. The Heald Grinder Co. recently has introduced an internal grinder which is hydraulically fed and is equipped with an automatic sizing device. Hydraulic operation is also utilized in the internal grinders made by the Greenfield Tap and Die Corporation and Giddings & Lewis.

In all of these machines a similar theory has dictated the design. The operator is relieved of practically all responsibility for the rate of feed. Tool life is prolonged and the production rate is increased. Instead of the man setting the pace for the machine, the opposite is the case, and some attention to the design of fixtures and unit operations makes the cutting time approximately equal to that of loading, so that maximum production per man-hour and per machine-hour is obtained.

A general survey of many of the automotive plants seems to demonstrate that more attention could be given to drilling operations. Where the tendency in turning and milling has been toward cyclic operation, this principle is not made use of in the small drilling operations on the same pieces. In many instances, this work is routed so that many of the operations are not readily visible to the operator. Consequently, tools break down and, more particularly, small drills break off and come around to subsequent operations and ruin more tools.

A great number of small parts in the modern automobile require two or more groups of drilling operations. There would seem to be a need for a specialized function machine of the cyclic type, a design in which all operations are in view and which consists of a number of interchangeable heads around a center pedestal. These heads should be designed for different ranges of drill size and for various speed and travel characteristics. Facilities for tapping, reaming, spot facing and counterboring could also be incorporated.

One machine hand recently propounded a question that may open up interesting possibilities. Why can't these rotary mills which are so fast on slabbing or end facing operations, be equipped with some sort of cam arrangement which will allow them to be used on shouldered work such as the manifold and valve housing surfaces on the side of a cylinder block? There probably are several objections to an arrangement which would permit of this, but some cam-controlled cross rail mounting of the cutter heads might accomplish this result.

An unusual development of the past year is the internal spline grinder which has been designed and put in service by the Packard Motor Car Co. The base of this machine resembles that of the usual cylindrical grinder. On one end of the bed is located an internal grinding head, at the center is a fixture head which can be rotated for grinding the hole in the gear or can be fixed and indexed for grinding the side faces of the broached and hardened splines. At the opposite end of the bed is the spline grinding head which is arranged so that a spool-shaped wheel is carried at the outer end of a rectangular steel arm. The working faces of this wheel are set parallel to the axis of the bed of the machine and the centerline of the gear and the wheel is driven by a small circular leather belt which passes over the depression in the spool, bearing directly on the abrasive material. In operation the gears are centered in ball chucks of the proper size in the center head. Then this head is rotated and the wheel at the left end of the machine grinds the bore to size. Following this, the belt drive to the center head is disengaged and the head is indexed by the usual plunger and bushing arrangement, while the spline grinding wheel is reciprocated across the splines. A built-up plug gage is used to hold the spline dimensions to very close limits.

Progress in Machine Shop Methods

The progress made in machine shop methods and equipment during the past year has been a direct continuation of an evolutionary development which has extended over the history of the industry, but the same cannot be said of body shop practice. The outstanding exception is the revolutionary change in finishing methods. A year ago, the first pyroxylin finish had just been announced and was being used in actual production at one plant. Since that time this type of finish has been adopted for one or more models by about half of the production plants. The Oakland Motor Car Co., the first regular user of this finish, have developed a number of figures which demonstrate the economy of this method as compared to their older varnishing methods. Actual labor-hours for finishing have been reduced from 6.7 to 5.7. Labor cost has been reduced by $0.04 per body, the former figure being $2.30. An important cut has been made in the production time, as varnished bodies required 236 hours, while with the new method of finishing only 13.2 hours is required. Floor space needed has been reduced by about 40,000 sq. ft. and the number of bodies in process has been reduced 75 per cent. The percentage of rejections has dropped from 20 per cent to 2 per cent.

During the same period, several color enamel or lacquer finishes have also been developed. With the former type of finish most of the regular oven equipment can be used and the methods of handling are similar to those used with black enamel. Production time is about the same as for a three coat job of the latter material, but the advantage of the option of several colors is an outstanding feature. In addition to these the Valentine Co. has brought out its super-system of varnish which combines shorter production time with greater durability.

Economy of Materials

In the direction of greater economy of materials, the Ford Motor Co. has evolved a scheme of laying out slabs of wood as they come from the saws. Ordinarily, these slabs are trimmed to rectangular shape, which may cause a considerable loss if the slab is somewhat irregular in contour. By laying out various body parts by

means of templets, much of this loss is conserved and the actual loss is represented by the more or less unusable portion of the slab.

A similar practice has been put into effect on metal sheets. Instead of trimming the sheet square as it leaves the mill, in some cases the sheet is trimmed at a slight angle which conserves the rough end. Following this procedure, parts which are to be stamped from the same sheets are laid out to reduce the waste material to a minimum. As the result of this practice, seven windshield brackets are formed now from a sheet of less width and length than was required formerly for six of these parts.

Machine shop methods have been applied in the body shop of the Packard Motor Car Co. with a high degree of success. Whereas the usual body shop is characterized by a profusion of wood fixtures and bucks of various types, this shop has been equipped almost throughout with metal fixtures and apparatus which bears the earmarks of machine shop practice. It was perfectly natural that the old body shops should have had wood equipment as this material and the tools for working it were immediately at hand. However, wood fixtures and bucks are of questionable permanency and accuracy and are materially affected by atmospheric conditions. As long as bodies were built rather than manufactured, this was of no vital importance, but with an increasing tendency toward true manufacturing, with its demand for uniformity and closer limits, the need for a higher standard of equipment became apparent.

With the more modern equipment and methods, limits on both wood and metal parts are held within a very few hundredths of an inch. Parts are processed with a degree of accuracy corresponding somewhat to that of the engine plant. Fixtures for complete closed body frame assembly, door assembly, rear upper panel forming and similar purposes are built up of cast iron, structural steel and aluminum members. Bearing plates, locating blocks and drill bushings are hardened steel so as to insure continued accuracy of location. Air cylinder equipment is used for holding metal door panels in place during the assembly with the wood frames. That the manufacturing idea is paramount is shown by the design of the bodies. The basic parts, such as wood pillars, etc., are the same for the six as the eight cylinder model. Therefore, tool and equipment expense is held down and a high degree of uniformity is insured.

A few years ago the idea of "manufacturing" a high grade body would have been ridiculed but the war and the Liberty engine have demonstrated that anything can be manufactured in the true sense if sufficient attention is paid to the demands of the design and the characteristics of the equipment. Quality is insured by the attention and inspection given to the component materials and by the maintenance of the accuracy of unit details.

Accounting in the Production Program

In most plants accounting has become part of the production program. The physical facilities represent one portion of the production program. Accounting, although intangible, is just as important, in that it is the force that coordinates the physical facilities. From the standpoint of the production department, accounting ordinarily is regarded as being the job of keeping production in balance, so that eight valve stem guides come through for each four cylinder block and a full complement of gears awaits each transmission case.

It must be admitted that this is the outstanding current requirement of any production accounting system. If it fails in this, the need for a better system already exists. However, the question of accounting for equipment is of almost equal importance to that of accounting for production parts, and in the long run has as much effect on the prosperity of the organization. Equipment represents a certain investment that begins to depreciate the first day in service. The rate of this depreciation and the rate at which the equipment is charged off has a great bearing on the financial aspect of the business in that they should determine when a machine should be scrapped and what effect the changing of models has on the balance sheet.

Some plants charge their machines off at a flat rate of 10 per cent, others use a figure as low as 5 per cent, while some go as high as 15 per cent. Any or all of these figures may be right or wrong, depending on the machine. Is the rate of depreciation for a turret lathe the same as that of a horizontal milling machine or a multiple drill press? How do the repair charges compare and what effect should these charges have on the rate of depreciation? How large an expenditure for repairs is justifiable after a machine has been in regular production service for four or five years?

On the whole, the automotive industry has been profligate of equipment—more so than any other established industry. The order "scrap it" or "throw out the whole line" has an incisive sound and promotes lightning changes in the product, but in the end this process is bound to meet with opposition from the financial heads of any organization. During the period when the demand ran away from the ability to produce, there may have been some excuse for this procedure, but the day is at hand when equipment must have earned its cost before it is discarded. Business is a process of getting a profitable return on an investment. The lower the investment, the simpler the problem of making a profit in a definite field becomes, other conditions being equal. For this reason a more accurate knowledge of the working life and value of equipment is necessary. Ten years service may be a fair performance for one machine while two years may be all that can be expected of a different tool.

These are questions of vital importance to any production plant. Several organizations are attempting the solution of this problem for its value in setting up financial standing, the effect on plans for future models and as an index of the relative value of various types of machine tools. It would seem that this industry has enough history behind it to justify some coordinated effort along these lines.

In the short span of twenty-five years, the automotive industry has revolutionized almost all previous manufacturing standards. Interchangeable manufacture, modern methods of inspection and production control have been developed almost entirely within the automotive field, but at the same time some faults have been acquired due to the tremendous rush to catch up with demand. Now that supply has caught up with demand and competition is becoming more acute, the methods of production and the business policies of the boom days will no longer suffice. Instead of organizing for a temporary rush, production men must study the demands of the "long haul." More intensive development of men, equipment and methods will have a constantly increasing effect on the prosperity and stability of every automobile and parts maker.

Future Production Economies Will Come from Detailed Changes

Opinions expressed at Society of Automotive Engineers' production meeting indicate that radical changes are likely to be few from now on. Attendance is unusually small.

THE "little drops of water, little grains of sand" theory is dominating production today. The era of radical changes in manufacturing methods seems to be past for the most part. Engineers are looking for large savings in the future only through the combination of a great number of minor economies. This was the chief impression to be carried away from the third annual production meeting of the Society of Automotive Engineers held at the General Motors Building, Detroit, Oct. 22-24.

The meeting also developed the fact that production men are becoming more and more interested in the structure and nature of the raw materials with which they have to work and are trying to get full information about such materials so that they may be able to handle them more efficiently and to better advantage in the future.

Considerable interest seems to center about labor and methods of wage payments, although the impression to be gathered at this meeting was that the problems of industrial relations, while strongly the concern of a few, still meet with only casual interest in general.

Trends Hard to Determine

It is more difficult to gage general production trends from this production gathering than from those previously held because the attendance at the Detroit meeting last week was much smaller than usual. Consequently, the discussions took on a more detailed character and, perhaps, did not represent as accurately as have others in the past a cross-section of what is on the minds of production engineers.

While about 300 registered as being present, not more than 125 sat in on any single session, while the average attendance ranged between 25 and 60. There was a good out-of-town representation at most of the sessions, but the Detroit production men failed to show up in as large numbers as had been expected. The small attendance was in decided contrast to the record-breaking crowds which greeted the first production meeting held in the same place two years ago.

The tendency to make savings by close examination of a multitude of shop details was illustrated in various papers dealing with such topics as waste elimination, small tool salvage, tool design, automobile shipping and plant maintenance. One speaker told how a man had been detailed to go about in the factory listening for escaping air that a 12-lb. drop in pressure might be cut down between the place at which the air pressure was generated and the end of the line. This is a fair sample of the detail into which the manufacturing men are going in an effort to reduce costs and eliminate waste.

The production dinner was held on Thursday evening at the Hotel Statler and was attended by about 175 people. Three speakers talked to the production men on some of the broader phases of the work.

"Be Bold!" Says H. H. Rice

"Be bold!" That was the message brought to the engineers by H. H. Rice, president Cadillac Motor Car Co. "Leave it to the general manager to caution 'be not too bold!'" he said. Urging originality in car design, he pointed out that progress comes through original thinking and that men of all kinds are too prone to follow in the beaten track.

Automotive advance during the last twenty years has come chiefly through cooperative effort rather than through individual achievement, Mr. Rice said, stating that it is difficult to associate with various major developments the name of only a single individual. Several men have had a prominent part in almost all of such forward steps.

Henry M. Crane, president of the society, who acted as toastmaster, brought an appreciative laugh from his audience with the remark that some companies seem to have adopted a policy of "semi-yearly models with no improvements." He went on to say that nearly every company has at least three models a year: first, the one asked for by the sales department; second, the one designed by the engineer; and third, the one built by the production department.

Man and Industry

C. B. Auel, Westinghouse Electric & Manufacturing Co. and president of the National Safety Council, urged reduction of accidents in industry and pointed out the absolute necessity for elimination of waste if we are successfully to meet foreign competition.

E. M. Muloch told the production men that manufacturing efficiency depends very largely on the ability of industry to adapt itself to the desires and needs of man. The human being, he said, is the most important element in industry and workers feel more

and more every year that they have a proprietary interest in their job. The job is to the worker much as property or securities are to the executive classes. It constitutes the workers' only stake in industry.

Plans and methods of dealing with workmen are not important, Mr. Muloch said, because the determining factor always is the spirit behind the management. If a spirit of justice and truth prevails the plan probably will be successful; if not, it is certain to fail.

H. L. Horning, president-elect of the Society, speaking briefly at the dinner, emphasized the need for a fuller consideration of the human element in solution of technical and production problems.

Gears Don't Make All the Noise

Whipping crankshaft, misaligned clutch shafts or a resonant transmission often responsible for sounds attributed to gears.

GEARS are not always responsible for the noises attributed to them. In many cases a whipping crankshaft or improper fuel distribution can be charged with the noise set up in the timing gear train. Misaligned clutch shafts and resonant transmission cases produce or magnify noises. Bevel gears in the rear axle may be ideally quiet on the test stand and still be unpleasantly noisy in service due to deflection and distortion of the differential carrier and axle housing. Poor lubricating conditions promote noise at all of these installations. In spite of all these extenuating circumstances, gears still must be held responsible for much of the noise and be regarded as the primary cause.

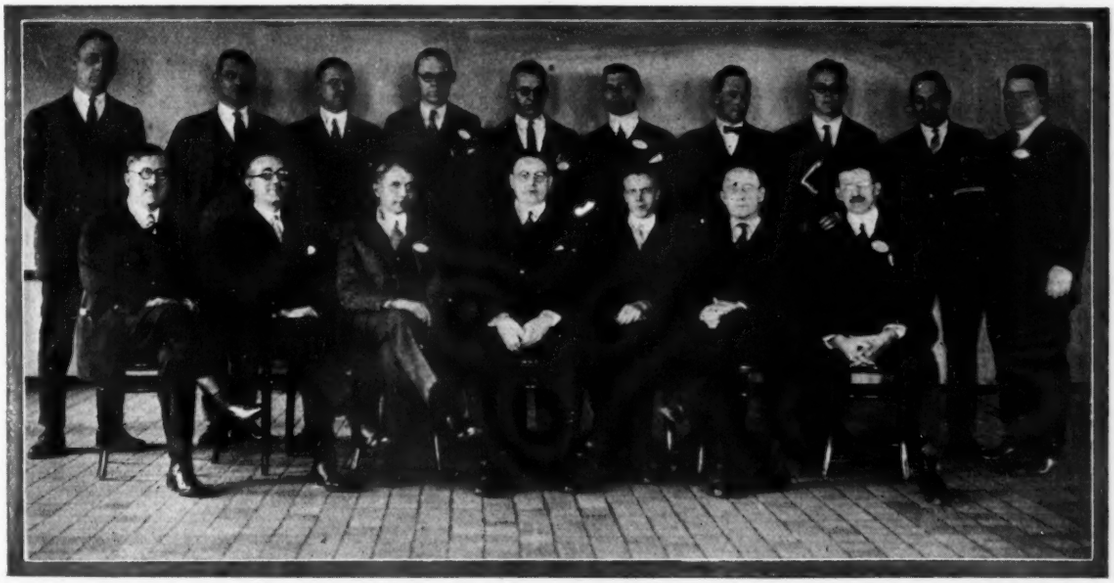
These were the outstanding ideas developed in an informal gear meeting which was held in conjunction with a dinner on Wednesday evening. About twenty-five men representing machine tool builders, gear manufacturers, drop forgers and car manufacturers were present. T. J. Litle, vice-president-elect of the S. A. E. and chief engineer of the Lincoln Division of the Ford Motor Co., presided and the principal talks were made by H. L. Horning, president-elect of the S. A. E. and head of the Waaukesha Motor Co., and Earle Buckingham of the Pratt & Whitney Co., who also represented the A. S. M. E.

Buckling crankshafts and bad distribution were the theme of much of Mr. Horning's talk. He also called attention to the effect of the magneto gear in producing noise at the front end due to its impulse action. For the present, he states, his attention is diverted from engine development and is engaged by the possibilities and necessity for gearbox development as he feels that engine development is at more or less of a standstill until quiet effective transmissions are developed. An engine which is properly loaded is not only quiet but economical and long-lived. The engines which give trouble are those idling or running at light loads for long periods. An overspeed gearbox which is not feasible at present is an attractive solution of the engine loading problem.

Photo-elastic Checking Methods

The Lewis experiments and new apparatus as well as photo-elastic methods for checking gear stresses and deformation were discussed by Mr. Buckingham. He related also his experience in adjusting the number of teeth on the countershaft of the gearbox so that the vibrations set up form harmonic chords. The noise from such gears is pleasant, and all gears are noisy, he states, while periods or relative gear ratios producing discords

Trying to Chase the Noise Out of Gears



A special dinner round-table meeting was held Wednesday evening for discussion of gear problems. Those present included Gould Allen, H. E. Blood, A. B. Bolender, Earle Buckingham, R. S. Burnett, W. L. Carver, Coker Clarkson, E. A. Garvin, K. L. Herrmann, H. L. Horning, B. J. Lemon, T. J. Litle, Jr., Glenn Muffly, A. L. Nelson, J. H. Nelson, Erik Oberg, L. D. Spence, C. H. Sterling, W. H. Watkins, J. A. C. Warner, and R. M. Williams

rank as unpleasant gear noise. He has found a relationship producing a chord in the minor third to be most unobjectionable.

The machine tool builder was criticized by K. L. Herrmann of the Studebaker Corporation, who stated that most of them do not take their own share of responsibility for quiet gears, but passed the problem over to the already over-burdened car builder. He also stressed the importance of gearbox design with the necessity for eliminating large plain surfaces. Curved surfaces and irregular shapes tend to prevent harmonic vibrations.

Camshafts of too small diameters were indicated as a major cause of engine noise by C. H. Sterling of the General Motors Research Corporation. He stated that while most designers have learned to appreciate the necessity for heavier crankshafts, they have tended generally to forget the importance of the same quality in their camshaft designs. Research work at Dayton has demonstrated the advisability of larger pitches in the timing gear train. The smaller number of teeth reduces the number of vibrations per minute and substitutes a greater element of sliding contact for the impact condition of smaller pitches.

Gear forging methods and their relation to the characteristics of the finished product were discussed by Prof. J. H. Nelson of Wyman and Gordon. Professor Nelson advocated the upset or similar processes of forging in which the fibers of each tooth are in similar conditions of stress and load carrying ability.

Immediately following these talks, a round-robin discussion, including practically everyone at the table, developed many sidelights of the gear and noise problems. The consensus of opinion was that the gear is the primary cause of many noises. In addition, room for improvement exists in some of the secondary factors such as gear boxes, shafts and axle housings.

How to Cut Machine Shop Production Costs

A. L. DeLeeuw outlines practical means of obtaining economies. Prominent German tool designer tells of European researches.

THE initial session proved to be of unusual interest, due particularly to the presence of Mr. A. L. DeLeeuw, a nationally known authority on machine design and production methods and Dr. Jng. G. Schlesinger of the Technischen Hochschule of Charlottenburg, Germany, the latter being one of the best informed authorities in the machine tool and related fields in Europe. Mr. DeLeeuw presented a comprehensive paper devoted to "Possible Economies in Automotive Machine Shop Operation" and took an active part in the discussion of the paper presented by A. R. Kelso of the Hudson Motor Car Co., who talked on "Coining Press Methods for Automobile Parts."

Dr. Schlesinger dwelt at some length on methods developed in Germany for checking the characteristics of twist drills and the methods and equipment adopted for determining the best rate of feed and speed in drill presses. In discussing coining press operations he advised of the development of an electrically operated press in which the flywheel and its inertia effect are eliminated. A direct connected motor, properly controlled, allows faster operation and eliminates the possibility of the destruction of the press which is a most important factor in this type of machine.

About seventy-five attended this session, over which John Younger presided.

Mr. DeLeeuw's paper is abstracted herewith and is followed by a paper presented by Mr. Kelso.

Better Shop Methods Urged

—A. L. DeLeeuw.

GENERALLY speaking, improvements in machine-shop methods may be divided into three classes: (*a*) the class requiring no capital outlay; (*b*) the class requiring a small capital outlay that cannot be considered as an asset but should be figured, partly at least, as an expense; and (*c*) the class depending on the capital outlay that becomes an asset.

The greatest possible economy in the drilling of holes is reached when the greatest possible number of holes is drilled at one time, when the holes are drilled at the greatest possible rate of penetration, when man and machine are both occupied all the time, and when no delay occurs because of breakdowns.

A number of years ago, the writer, then chief engineer of the Singer Manufacturing Co., had a series of tests conducted to determine what make of twist-drill should be specified. All drills used were 5/16 in. in diameter. Practically all the makes of twist-drills.

The feed-pressure was obtained from a weight hung over a pulley. The time required for penetration was determined by a stop-watch. The test was discontinued when the time required for the penetration of the plate had become 50 per cent greater than it was at the beginning of the test.

Some makes of drill would drill 600 holes before becoming dulled to a 50 per cent greater time, whereas others would break down completely after drilling two holes.

It is important that a proper study of the drill itself be made. The difference in performance indicated is so great that the idea must be discarded that any standard make of twist-drill is about as good as any other.

It is therefore to be recommended that the behavior of tools be studied and a schedule made up as to the length of time they should be left in the machine.

When a tool is removed before failure, only a very small amount of grinding is required to restore it to its original condition.

To recapitulate: In order to obtain the greatest possible penetration per unit of time the proper drill should be selected, its proper combination of feed and speed for the drilling of a given material should be determined, the lips should be ground as nearly as possible of even length, and a period should be established for the active life of the tool before it is resharpened.

Among the causes that prevent men and machines from being occupied all the time are the following:

(1) The machine is necessarily non-productive while the man is loading a fixture.
(2) The man is necessarily non-productive after he has started the machine.
(3) Man and machine are both non-productive while the man arranges or removes a quantity of work.

A class of device that can be applied to drilling-machines, and for that matter to other machines as well, includes the automatic stock-feeding devices, such as hopper feeds, magazine feeds, dial feeds, and the like.

There is good ground for a difference of opinion whether such devices should be classed among accessories or among permanent additions to the machine. It is sometimes one, sometimes the other.

Another class of device that may be employed either alone or in combination with magazine feeds is the pneumatic or hydraulic chucking-device. As a whole, it may be said that these devices are not employed as much as they deserve.

A wide field exists for the use of multiple-spindle tapping-machines, properly arranged gang-drills, and what might be called combination machines, machines that will do drilling, reaming, facing, tapping and the like in the same way that a multiple-spindle automatic screw-machine performs its operations.

The automotive industry has not yet been sufficiently standardized to make the development of special machines entirely safe. On the other hand, most of the ordinary standard machine tools may be called overdeveloped for this industry. Wide range of feeds and speeds, universal adjustments, and the fact that they allow a wide variation in the dimensions of the work make them suitable for jobbing work, but too complicated and, consequently, too expensive for what is required of them in the automotive industry.

Among the things that can be done to cheapen production, without requiring a material outlay of money or a change of equipment, are the more extensive use of end-mills, the use of gang-mills, especially arranged for some definite operation and kept for that purpose only, and the application of stream lubrication.

Among the methods of milling that should be employed to a much larger extent than they are employed at present are continuous milling with the help of a rotating table, either on a vertical or on a horizontal machine, the use of loading-fixtures, and semi-automatic and automatic milling.

As to the needs of the automotive industry for new types of machines, I would mention very small semi-automatic millers, for light cuts on the smaller pieces, and multiple-spindle milling-machines.

Grinding operations lend themselves probably to greater improvements than do any of the simple cutting operations.

It seems that the use of wide wheels in grinding practice should be largely extended.

Grinding lends itself very well to the use of magazine feed. So far, magazine feeds have been confined mainly to centerless grinders, but in other industries automatic grinding-machines with magazine feed, using wide wheels, have been developed and are used very successfully. If possible, the wheel should be given a slight shaking-motion in the axial direction, when the end of the cross-feed or the in-feed has been reached.

I have succeeded in producing a very accurate size and a very hard and glossy surface in cast-iron bushings by running through the bushing a piece of hardened steel resembling somewhat a straight-fluted reamer with gentle taper, but having the ribs rounded instead of presenting cutting edges. Substantial improvements can be made and at the present time at least, efforts in the direction of economy should be directed toward the small pieces and small operations.

Coining Press Operation

—A. R. Kelso.

INCREASED schedules made equipment for milling or spot-facing forged arms and levers inadequate. This need was particularly manifested in brake and equalizer mechanisms.

Data relating to coin-press methods were secured. Some of the heat-treated forgings, made from S. A. E. No. 1045 steel having a Brinell hardness of 197, were tested under the Olsen universal-testing machine. This test determined the load necessary to compress the part to the desired dimension.

A 400-ton knuckle action coining-press was installed. The finish allowance required for cutting on each surface was reduced from 1/16 to 1/32 in. With parts having two or more bosses of different thicknesses, steps were arranged on the dies whereby all the bosses could be squeezed at one cycle of the press.

Very close limits were maintained, due to the fineness of the ram adjustment. Based on an efficiency of 75 per cent, a production thirteen times greater than that with the machining method was attained. The result was that one man and one machine replaced twelve machines and as many operators.

To determine the most suitable die materials, several sets of dies were made of different grades of cold-forging die-steel. The average run from the standard brands was limited to 6000 pieces. It, therefore, became necessary to resurface them for either or both of two causes: (*a*) fracturing of the working surfaces due to the extreme pressure to which they had been subjected, and (*b*) an impression of the part in the die at the point where pressure had been applied.

To correct the difficulty encountered due to break down of die materials, resort was had to a special steel of the analysis shown in Table 1. This composition was properly treated to a scleroscopic hardness of 90. The average output per grinding of the die surfaces rose to 40,000 pieces.

Table 1—Analysis of the Special Die Steel Used

	Per Cent
Silicon	0.050
Manganese	0.200 to 0.300
Carbon	0.670 to 0.800
Chromium	0.090
Vanadium	Trace
Sulphur	0.021
Phosphorus	0.010

After the four 400-ton machines had been in operation for a period of time with satisfactory results, it was decided that the next step would be the squeezing of the connecting-rods.

An 800-ton press was selected for this work. It in-

A. L. DeLeeuw gave some practical hints on cutting production costs

L. A. Churgay told how savings can be made in salvaging small tools

creased the production 251 per cent, when one operator was hand-feeding the press. After a feeding mechanism had been installed on the press to eliminate any possible chance of injury to the operator, the production was again increased 147 per cent. This final result was 370 per cent greater than the production attained by milling. The product continued to be held to the 0.004-in. tolerance specified.

The magazine for feeding the connecting-rods proved satisfactory as a production and as a safety factor. Therefore, a feed mechanism was designed to take care of all the parts except those that required to be held in position while squeezing at a local point. With this arrangement, the work is fed to the die by a slide equipped with detachable fingers. These fingers are designed to meet the requirements of the individual part that is being pressed.

To assure the greatest safety to the operator and keep him at a safe distance from the ram, a pull-type feed with a 12-in. stroke was installed.

The recommended speed of the press is 32 cycles per min. At this rate, however, the speed of the feeding device was so great that inertia forced many pieces through beyond the die. Therefore, the work was made to pass under a flat spring acting as a drag. .This permitted handling the smallest parts while the press ran continuously at the desired speed.

Believing that it would be of general interest to know what happens to the grain structure when a forging is coin-pressed, an investigation of this was made.

Several sections across coin-pressed areas were examined. It was impossible to note distortion of the grains, at 100 diameters magnification. Because of the fine-grain structure of the heat-treated connecting-rod, any change that had taken place would have been difficult to discern.

From the foregoing, the conclusions reached are that

(1) A coining press will squeeze parts to size with the same degree of accuracy as is accomplished by the removal of surplus stock through cutting operations.
(2) There is absolutely no difference in the molecular consistency of the parts after they are squeezed.
(3) Under quantity-production conditions, the average number of parts prepared per hour by a coining press is 900 per cent greater than is secured with usual machining methods.

New Processes Provide Durable Nickeled Parts

Tests show average thickness of plate to be less than 1/10 that of tissue paper. Packard process outlined in detail.

IMPROVEMENTS in the methods employed in finishing nickeled parts which have resulted in greater durability were discussed at the plating session in papers presented by W. H. Graves of the Packard Motor Car Co. and by W. M. Phillips of the General Motors Corp. Both speakers agreed that the surfaces to be plated must be smooth and clean initially and that the copper and nickel plates should be comparatively heavy if the finished product is to have the desired degree of durability.

In the Packard process, the surfaces are first put through five polishing operations, after which they are thoroughly cleaned. To make sure that they are free from grease, the parts are dipped in water and, if the film does not break, they are assumed to be ready for plating. Moving cathode tanks with a current density of from 25 to 30 amperes per sq. ft. are used. The cycle takes 17 minutes.

Dr. Jng. G. Schlesinger, a guest from Germany, presented some ideas on tool dangers

The parts are next buffed to give a smooth finish to the copper plate, after which they are cleaned and tested for grease before going into the nickel bath. This tank is also of the moving cathode type. The current density here is 11 amperes per sq. ft. and the cycle takes 40 minutes. It will be noted that the current densities used are comparatively high, which gives the desired thickness of plate. The preliminary polishing and cleaning operations are also important factors in preventing rusting and peeling. The plate obtained in this way will undergo a 24 hour salt spray test satisfactorily.

In regard to the thickness of the plate, Mr. Phillips stated that some recent tests on some nickeled parts for a popular priced car indicated that the thickness ranged between 0.0001 and 0.0002 in. The thickness of a piece of tissue paper is 0.002 in., and hence the average thickness of the plate is less than one-tenth that of tissue paper. The other protective coatings on the car, such as paints and enamels, vary from 0.002 to 0.004 in.; that is, they are 10 to 20 times as thick as the plating. He also pointed out that savings often can be made without reducing the durability of the plate by cutting down on the polishing time and by using the money saved to increase the thickness of the plating. He recommended a copper plate of 0.0003 in. or more in thickness, as this metal is softer than steel and it is consequently cheaper to prepare it for the subsequent nickel plating.

In connection with reducing the number of polishing operations and increasing the thickness of the plate, Mr. Phillips made the following cost comparison:

"Considering a steel radiator-shell, for example, the cost of each polishing operation may average 9 cents. If seven polishing-wheels are used, the polishing will cost 63 cents. The plate will be about 0.0002 in. thick and will cost about 6 cents. The most of these costs is for labor. Two buffing operations at about 9 cents each will cost 18 cents; making the total cost about 87 cents.

Production Men Go to See How Ford Does It

On the last day of the meeting, the production men spent the afternoon visiting the factories of the Ford Motor Co. and of the Continental Motors Corp.

"If the heavy-plate method is used, two polishing operations can be eliminated; and, if five polishing wheels are used at 9 cents for each, the cost will be 45 cents. A heavy plate requires that the work remain in the plating-tank longer and means that more metal will be deposited, but the amount of labor required remains the same. Suppose the heavy plate costs 12 cents more than does the plate for the former method, and that the buffing costs 2 cents more, the finished-product cost will be about 2 cents less than with the usual method, but the plate will be three times as thick.

"Thickness of plate can be determined by chemical analysis. A piece of paper or other suitable material 1 in. square is placed on the finished surface and brushed over with paraffin; the paper square is then cut out with a sharp knife and removed, the plating under it is dissolved with nitric acid and the amount of plate metal determined by usual methods."

Balloon Tires Increase Shipping Troubles

Only treads on tires should come into contact with blocks. Dodge and Studebaker methods form chief basis of discussion.

INTEREST at the shipping session centered on methods of overcoming difficulties encountered in the transportation of balloon tire equipped cars by freight. Loading practice at the Dodge Brothers plant was described in detail in a paper presented by Ben Moore and the use of front axle bucks by the Studebaker Corp. was explained in a brief paper by Frank Henry.

The shimmying and climbing tendencies displayed by balloon tires inflated to normal pressures are being overcome generally by raising the pressure to from 55 to 60 lb. during shipment. The importance of having only the treads of the tires come in contact with the blocks was emphasized by Mr. Brown because, if the grooves are of such shape that their edges come in contact with the side walls of the tire, chafing, with consequent damage, will result. This necessitates more accurate grooving of blocks to be used with balloon tires, and greater care must be exercised in placing them on the car floor than with high-pressure tires.

Mr. Brown mentioned that one of the railroad companies is putting a new design of automobile freight car in service which has a height of 9 ft. 4 in. and which is provided with ringbolts to facilitate the use of chain falls.

Mr. Henry's paper described the front axle bucks used by Studebaker. They are of wooden construction, bolted together. The grooves in which the axle rests are faced with a stamping. The axle is clamped to the buck by a U-bolt which passes over a stamping placed on the top of the axle. With balloon tires, Evans spring hold-downs are used at the rear of the car.

Experiments in Packing Methods

In the discussion following the presentation of the papers, E. S. Evans described some experimental work done by his organization. He stated that it has obtained satisfactory results with 6 and 7.20 in. balloon tires on flat face blocks and on blocks grooved only to a depth of ½ in., whereas the groove depths commonly used range from 1½ to 2 in. Referring to hold-downs, he stated that dynamometer tests indicated that they were subjected to maximum stresses of about 6000 lb. with balloon tires as compared with 4000 lb. with high-pressure tires and that consequently they should be made about 50 per cent stronger.

Production Men Favor Group Wage Systems

Divided as to merits of piece-work as opposed to bonus type, but agree that some method of payment by gangs is desirable.

PROVISION of incentives which will satisfy the desires of the individual workman is the chief need of modern industrial relations. This was one of the important thoughts developed by the discussion of wage-payments and human relationships at the session on labor and wages.

"Industrial organizations have spent millions of dollars for fool proof machinery," said Dr. C. A. Lippincott of the Studebaker Corp., "and then have gone out and hired fools to run them." Man is the most important problem in industry," he pointed out, adding that "Men will follow the humane leader with enthusiasm, but will buck the driver at every opportunity."

H. G. Perkins, Maxwell Motor Corp., urged the merits of a properly applied group bonus system as a method of wage payment. The advantages of some sort of group system were admitted by practically all of the production men present, but some were inclined to favor a group piece work method rather than the bonus system outlined by Mr. Perkins in his paper on "The Group-Wage Payment Plan."

Group-Bonus Plan Urged

—H. G. Perkins.

TO make such a plan successful, Mr. Perkins said, it is necessary to observe fundamental principles in applying it. These fundamentals are:

1. Individuals can be grouped successfully only when they have a community interest in the result of their combined efforts.
2. Individual interest in individual accomplishment must be retained, the success of the group being based on individual incentive and ambition.
3. The group must receive *all* the directly increased wages accruing from increased production.
4. The plan used must be sufficiently simple to be understood by the workmen.
5. There must be confidence in the management, induced by the square deal.
6. The supervisory and operating personnel must believe in the group idea.
7. The system should be installed by thoroughly competent specialists, who are familiar with the functions of the time, cost, inspection, planning, and shop departments.
8. There must be a just distribution of group earnings to the individuals of the group.

The last-named of these principles requires routine that is sufficiently flexible to operate successfully when recognition is given to the following variables:

1. Different degress of skill and ability are required on different operations within the group.
2. Different degrees of skill and ability will be found in different workmen engaged on the same or parallel operations within the group.
3. Veteran employees are entitled to more consideration than are newcomers.

The beneficial results accruing from the installation of a group-bonus plan in the Maxwell plants, according to Mr. Perkins, include a spectacular increase in produce efficiency, better spirit among the workers, reduction in direct costs, lowering of scrap losses, and many other advantages. "The group payment plan was not installed primarily to reduce labor costs," he said. "In fact this was an after effect. Our principle purposes were to maintain a high standard of quality, to protect the payroll by securing greater accuracy in production counts, and to eliminate the expense of securing and tabulating these counts."

Before the installation of the group-bonus plan was attempted generally, Mr. Perkins said, experimental installations were made in two departments. On the basis of the experience gained there, principles were formulated which resulted in the successful introduction of the system into a large proportion of the departments of the factory. Tool and die makers are not paid on this basis, nor are inspectors, he stated.

Considerable discussion arose over the relative merits of the group-bonus and the group-piece work system, proponents of the latter claiming that it provides standard costs figures of stable character with mimimum effort. Those who favored the group-bonus method of payment, on the other hand, pointed out that it permits wages to be raised or lowered with much less difficulty because the base day rate can be changed without affecting the standard time. Under the group piece-work system, it was claimed, the raising of one man's percentage simply lowers the wages of the rest of the group since the cost of the piece must be the same in any case.

Mr. Perkins said that the group-bonus system never has been discontinued at the Maxwell plant after it once has been installed, but that in several departments it has not been considered advisable to attempt installation up to the present time. The plan has been in operation for two years.

Two Speakers

Dr. C. A. Lippincott discussed the individuality of workers

A. R. Kelso told of new uses for the coining press

The system works best, he said, when the day rate is a high percentage of the total pay and when the gangs are relatively small. In some case it is necessary to have groups as large as sixty, but for the most part they are much smaller, running down as low as three.

Pieces which fail to pass inspection because of defective workmanship are not counted at all and are passed again through the production line. Pieces which are defective because of flaws in the material, on the other hand, are credited to the group total.

Independent Thinkers Best Workers

—C. A. Lippincott.

TALKING on "The Labor Turnover Problem," Dr. Lippincott placed himself in definite opposition to paternalistic welfare plans. He opposes them, he said, because he considers them to be morally, ethically, and economically unsound. It has been proved by practical experience, he said, that the independent, self-confident, self-reliant man makes a far better workman than does the servile, humble type of employee. Industry should try to preserve rather than to destroy these qualities in the youth of America, Dr. Lippincott believes.

He considers employee representation plans as still in the experimental stage and doubts, somewhat, the desire or ability of most workers to participate in the functions of management.

He outlined the Studebaker employee relationship plans which include:

1. Anniversary checks. Each employee receives a check amounting to 5 per cent of his earnings at the end of his first year's employment and at the end of every year thereafter up to five years. After that his check is for 10 per cent of his year's earnings.
2. Vacation with pay for each employee after he has been with the company for two years.
3. Stock ownership plan. The stock is sold to employees at 1 or 2 points below the market price. Employee stock is paid the regular dividend plus one-half the regular dividend.
4. Pension plan which provides for retirement after 20 years of employment and at the age of 60 years with 25 per cent of average pay for last five years with a minimum of $30 per month.
5. Pensions for dependents of workers under certain conditions.

All industrial relations, Dr. Lippincott concluded, must rest on two essentials: humanity and justice.

What Constitutes Good Automobile Glass?

J. H. Fox outlines specifications. Says that qualities needed in fine mirror glass should not be demanded. Defects listed.

A PAPER on the manufacture of plate glass by John H. Fox of the Pittsburgh Plate Glass Co. and an impromptu talk by Mr. Avery of the Ford Motor Co. were the features of the glass session. After briefly touching on the history of glass manufacture and explaining modern methods of production, Mr. Fox discussed the qualities desired in automobile plate glass.

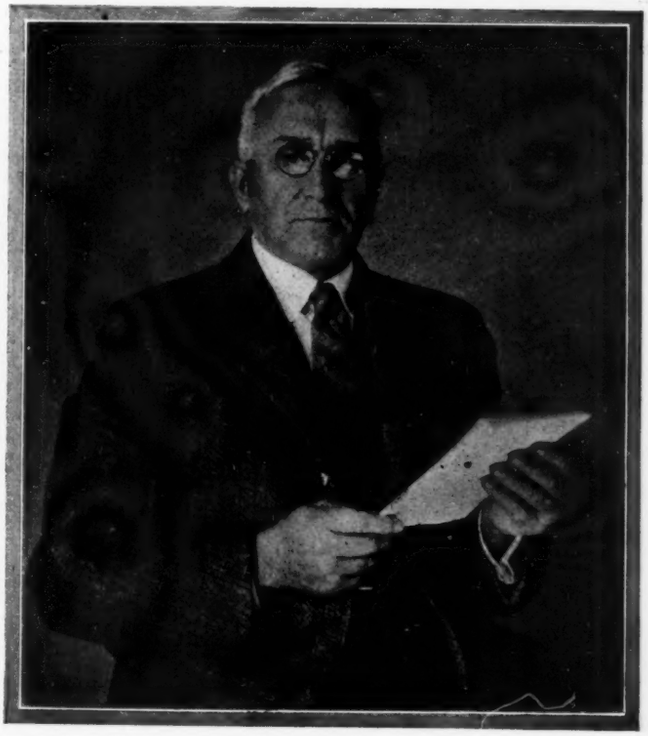
The most important quality desired in automobile glass, he said, is clear vision without distortion. Distortion is caused either by an unhomogeneous glass having a varying refractive index or by a wavy surface causing the rays of light to be deflected irregularly at the surface of the glass. Due to the methods of manufacture, the latter defect is not present in plate glass as the surfaces are plane and parallel.

Lack of homegeneity of glass, known technically as ream, is the only defect in polished plate that can cause distortion and this is very slight as compared with distortion caused by wavy surface in fire-finished window glass. Ream is practically unavoidable in fire-finished glass.

Defects caused by opaque particles resulting from unmelted batch materials, bubbles larger than 3/32 in. in diameter, streaks of minute bubbles (less than 1/32 in. diameter) and long heavy scratches, should not be permitted. Defects such as bubbles less than 3/32 in. in diameter, light surface scratches and threadlike transparent lines caused by small portions of the batch material being melted and drawn out but not reduced to the same optical density as the body of the glass, should not be considered objectionable when they are removed from the central portion of the glass as they are not seen.

It is a mistake to apply too high a standard, with reference to certain minor defects, or to apply the same standards that are required for a high grade mirror. To carry the specifications too far in this respect increases the cost of the glass with no corresponding advantage to the ultimate purchaser. With present methods, it is practically impossible to make the entire output of a factory of a given quality. To attempt to produce a large

Tells How Glass is Made



John H. Fox, Pittsburgh Plate Glass Co., told what constitutes good automobile glass

percentage of first silvering quality glass, would increase the operating cost per square foot tremendously due to the precautions necessary and also to the high percentage of rejections.

The maintenance of extremely close thickness limits would also add materially to the cost due to the frequent gaging that would be necessary. The present practice is to grind the rough plate down to the level of the bottom of the lowest indentation. A tolerance of 1/32 in., plus or minus, was given as commercially practical on automobile plate.

For use in automobiles, a glass is desirable which will withstand as great a shock as possible without breaking and which, when it does break, will do minimum damage. The strength of glass is determined to a considerable extent by the rate of cooling. In a properly tempered plate, moderate tensile stresses exist in the center and moderate compressive stresses in the surfaces. As the crushing strength of glass is several times its tensile strength, its resistance as a beam is increased if initial compressive stresses exist in the surfaces.

Care should be exercised in mounting the glass in its frame to avoid distortion as this reduces its resistance to breakage and also distorts vision. It is also important to have the edges of the plate smoothly finished as cracking or chipping frequently starts from a ragged edge.

Mr. Avery stated that the greatest difficulties encountered by the Ford company in its continuous method, are caused by variations in the material. He said that glass could be produced by this method with a smaller investment and at a considerable reduction in cost. In this connection, he pointed out that Ford was producing only in 40-in. widths and that the economies they had made would not be possible in a plant making glass for general sale.

In response to a question as to the effect of the Volstead Law on the price of automobile plate glass, Mr. Fox pointed out that no reductions could be expected as the plates used for bar room mirrors were of inferior quality. Distortion in this case was not considered objectionable, as after taking on generous supplies of fire water most anyone is likely to see double.

Four Factors Involved in Good Tool Design

Sound design includes using full machine capacity, cutting idle and loading time to minimum, and having short spindle travel.

THE session devoted to tool design attracted a good attendance and opinions concerning the basic requirements of tool and fixture design were discussed by machine tool builders, factory men and tool designers. Joseph Lannen of the Paige-Detroit Motor Car Co. presented "Some Notes on Tool Design," in which he laid down the fundamental requirements of good jig and fixture construction. He stated that consideration of the ultimate quantity and the daily quantity to be produced is the primary element in establishing the type of machine for a specific operation and the corresponding jig and fixture equipment.

In the design of the individual jig or fixture, four requirements determine the characteristics, as follows:

1. The full capacity of the machine must be utilized.
2. The idle time must be the minimum.
3. Loading time shall be at a minimum.
4. The shortest possible spindle and table travels shall be used.

All tools and fixtures designed at the Paige plant are passed through an estimating department which sets the total price. This constitutes the price for the tool room and any saving made in the tool room is split with the employees of that department as a group bonus. The

Some of the Visitors at the Ford Plant

Among those present at the factory visits were J. W. Pearson, Eugene Bouton, F. R. Lockwood, F. H. Condit, John Younger, K. E. Karlson, G. H. Keogy and J. C. Teeton

amount to be paid this department is prorated on the earnings of the various members.

"Avoiding Mistakes in Tool Design" was the subject of a paper prepared by P. V. Miller of the Taft-Pierce Co. and presented by Mr. Lyman, Detroit representative of that concern. This paper was based on the experience obtained in making tools and fixtures for various types of companies. It is stated that too many companies design fixtures which are too high priced for their utility.

In many cases designers lean over backward in establishing tolerances which are not essential for the characteristics of the part to be machined. This company regards the following characteristic as essential to good fixture design:

1. Location of the work in the fixture by means of hardened buttons or plates.
2. Holding and clamping the piece in such a way that distortion will not be induced.
3. The structure and weight of the jig must be sufficient to insure rigidity and continued accuracy. If operations are located on different surfaces, trunnions should be used.

Future Profits May Come from Scrap Pile

America characterized as "nation of wasters" by Carl B. Auel. Efficient use of products necessary to national development.

MANY of the future profits of the automobile industry will be dug out of the scrap pile, if the ideas advanced at the waste reduction session are to be considered as common among production men of the industry. Carl B. Auel, Westinghouse Electric & Manufacturing Co., characterized the United States as a "nation of wasters," adding that we have accomplished many wonderful things but at a tremendous cost. L. A. Churgay told how minute economies can be built into material savings in the salvaging of small tools, while various speakers in the discussion detailed specific methods for cutting corners and saving pennies.

Great Achievement at Great Cost

—C. B. Auel.

MR. AUEL pointed out that the task of waste elimination involves four major parts:

1. Prevention of waste.
2. Reclaiming of unavoidable waste.
3. Disposing of waste to best advantage.
4. Applying waste of other manufacturers to one's own products.

"All departments in the works naturally assist in the prevention of waste," he said, "some to a greater extent than others as would be expected." The chief departments having to do with waste elimination, however, in Mr. Auel's organization are:

1. Standards division, engineering department.
2. Standards committee.
3. Disposition department.

Continuing, Mr. Auel said in part:

"The standards division of the engineering department, as its name in some measure implies, has to do with the standardization, within certain limits, of most of the production and a number of the expense materials.

"Not only are savings possible, because of the reduced kinds and sizes of stocks carried and the simplification of records, but the liability is lessened of dead stocks being left on hand when designs have been superseded or improvements made, for the parts are more nearly common to all sizes. Lower prices, moreover, can frequently be obtained through the purchasing of larger quantities of each kind, consequent upon the fewer sizes.

"To keep from retrograding, all requests for production materials must pass through the standards division, whose work has just been described, en route to the purchasing department, so that opportunity may be afforded for scrutinizing them. If a new item appears, inquiry is at once made of the department desiring it, to determine whether it is essential to depart from the standards that have already been established.

"Whenever changes in design are contemplated, a complete study of the stocks on hand, or purchased but not delivered, is made to determine when such changes can best be put into effect. This study covers machine-tools, equipment and floor space, as well as the question of supply parts; in fact, endeavor is put forth to see that no point is overlooked, and the probable advantages are carefully weighed against the possible disadvantages. Experience over a period of years has enabled us finally to develop a course of procedure that seems to meet our needs, for, in several instances, it has allowed a rather extensive series of changes to be made in a complete line of apparatus, with a write-off of only a small fraction of 1 per cent.

"The disposition department, which is the third of the three main departments mentioned as having to do with waste and waste prevention, embraces more than the salvaging of waste materials, for it endeavors as well to reduce or to eliminate waste of all kinds.

"The disposition department gives the larger share of its attention to inactive stocks, raw, semi-finished and finished. These are regularly reviewed, the idea being to endeavor to prevent their becoming obsolete. This is accomplished in various ways, advantage being taken of any existing channels that seem to offer opportunities for disposal, though the department is empowered, if necessary, to create new ones.

Handling Inactive Stocks

"All inactive stocks, and these embrace not only those showing no movement, but those showing insufficient movement over a given period, are listed and at the same time depreciated and passed on to the disposition department for treatment that will tend to put them back into the active class or at least prevent the necessity for more drastic action. If, at the end of a year, the disposition department has been unable to get results, the stocks are further depreciated, the disposition department meanwhile continuing its efforts to move them. If, at the end of another year, they are still inactive, they are transferred to the obsolete class, are more heavily depreciated and, within the following six months, if movement fails, are disposed of.

"A scrap department has, of course, been installed. This is fitted with all the necessary appliances that go to make a complete outfit of its kind. Reclamation and prevention of waste are like electricity, as yet in their infancy."

Salvaging Small Tools

—L. A. Churgay.

"THE functions of tool salvage are not necessarily limited to reclaiming wornout or rejected tools," Mr. Churgay said in his paper on "Tool Salvage." "Due to engineering changes of the product and changing of manufacturing methods, a great many tools become obsolete and a careful survey of the tool supply stores frequently disclosed a surplus of tools representing considerable capital tied up. To adapt these tools for shop requirements, or to find an outlet for them at somewhere near their value requires careful planning.

"The man in charge of tool salvage must have a broad, practical knowledge of the various tools and high speed steels and their treatments, of the possibilities of welding and methods of grinding. He must possess considerable enthusiasm and constructive energy for this particular work, also good sound judgment in directing his efforts so that real economies are effected and tools are salvaged at reasonable costs.

"In planning the work to be done on profitable basis, the men must be trained to specialize in certain operations. For example, the man engaged in welding high speed tool bits to carbon steel shanks or welding new heads on braces and socket wrenches and becoming efficient in this work must not be expected to be equally as efficient in precision grinding of tools. There are, however, many other jobs that he may be employed at, such as recasting lead hammers, refacing copper and rawhide hammers, brushing and sandblasting files, etc.

"The Salvage Division is not organized to attempt to set a basis for an accurate percentage of new tool expense saved by the use of reclaimed tools. Its ultimate purpose should be functioning with the least possible friction and concurrently rendering the most effective service to all other departments."

Various methods of salvaging drills were outlined in the discussion of Mr. Churgay's paper. Mr. Churgay said that in the system used by his company the workman does not know when he is using a salvaged tool. The tool goes from the salvaging department to general stores, into which it is accepted as a new tool. General stores then issues on requisition just as it does new tools.

Production Methods Urged in Maintenance

Careful organization needed in factory repair work. Spirit of cooperation essential between maintenance and production work.

THE factory maintenance session of Friday morning was featured by a comprehensive paper entitled "Organizing for Plant Maintenance Work," which was presented by L. A. Blackburn of the Olds Motor Works. This paper clearly demonstrated that maintenance is an engineering problem.

Up-to-date instruments and methods not only keep machines running, but also develop economies not possible under the older methods. By these methods enough economies in the boiler house alone are effected to pay for the services of several high-grade departmental heads.

In a large plant this work cannot be handled on a hit-or-miss basis, but must be organized in the same manner as the production lines. A brief shutdown which might have been prevented by modern maintenance methods sometimes is more expensive than the additional cost of improving the scope of the maintenance department.

Following this paper, E. E. Remington of the Ford Motor Co. outlined briefly the maintenance methods of that company and presented a series of slides which illustrated some of the devices in use. Mr. Remington, who has been at the head of Ford maintenance work for about twelve years, advocated the development of a spirit of cooperation between the heads of specialized maintenance and the production departments. He also emphasized the necessity for maintaining standard methods and using standardized equipment wherever possible.

Making Maintenance Effective

—L. A. Blackburn.

MR. BLACKBURN said in part:

"The scope and success of a maintenance organization depend upon the initiative and ambition of the maintenance engineer. The scope of his work covers the principal fields of applied engineering: mechanical, electrical, civil, power and structural; sanitation, ventilation, fire-protection, plant-policing, plant-layout; production, production-machinery and plant-transportation.

"The most desirable type of plant guard that we have found is an ex-service man between the ages of 45 and 55. If he is a retired officer, he has handled men as men and not as criminals, he appreciates the value and meaning of orders, and he executes them. Quite often a visitor's impression of a plant is formed by the reception accorded him by the officer at the gate.

"In a plant in which paints, varnishes, oils and combustibles are handled the fire risks are reduced by rigid inspection. The inspectors must be familiar with the processes, must provide ways and means for reducing the risk to the minimum, and follow them up every day. Spray booths, unless properly cleaned, are very dangerous and should have careful attention, especially where duco has been used. Oily rags when allowed to accumulate constitute the most common hazard.

"The inspectors should be thoroughly conversant with all the regulations of the National Board of Fire Underwriters as recommended by the National Fire Protection Association.

"With one general foreman in charge of the sweepers and the janitors, the responsibility for cleanliness and sanitary conditions is placed on one man. At the same time an opportunity is afforded to make a saving by special instructions and teamwork.

"Although the operation of the powerplant is not primarily a maintenance problem, it has been placed under the maintenance engineer. It is the only producing unit in the maintenance department and on it the entire production of the plant depends. The organization should therefore be selected with the greatest care. A 1-per cent saving in fuel will pay a very attractive salary to a good combustion engineer in a boiler plant of 2000 hp.

"Boiler-room records constitute one of the most important items of the operating engineer. Making steam is

more than simply burning coal and boiling water. Steam-flaw meters, boiler feed-water meters, CO_2 recorders, gages and temperature recorders supply the necessary data with which the engineer may check the leaks.

"Since I have been connected with the automobile industry I have heard of motor troubles in the cylinder-block-machining departments. The trouble was serious, we will admit, but not so bad that it had no cure. We applied the same treatment that was used and developed by the powder industry during the war. It worked almost perfectly, but not without rigid inspection and the necessarily frequent cleaning of the motors. It works so well that a shop that formerly had four armature-winders, who could not rewind the armatures as fast as they burned out, now has one winder who takes care of all the work.

"The question of accurate departmental cost is becoming more necessary as the knife of competition continues to cut in. To meter accurately the consumption of gas, water, oil, steam, electricity and air in every department would be ideal, but would be rather expensive. Some of the utilities are more easily estimated than are others. Steam for heating can be distributed very accurately on a basis of the cubical content of the building, its exposure type, and the like; lighting can be estimated on a basis of the wattage installed and the nature of the operation.

"To estimate electricity for power is more or less a hopeless job; but, on the other hand, the power can be easily metered. The meter department should therefore measure all utilities, so far as is practicable, and apply the cost to departmental expense rather than to a general burden or overhead expense.

"The work of the machine-repair department begins with the arrival of the machines in the plant. Every machine is numbered and a card record is made for it.

"The personnel of the department should consist of the highest-grade mechanics, next to tool-makers, that can be secured. The shop should be complete in every detail for building all kinds of parts for machines and to it all major repairs will be sent.

"The planning department should always anticipate production, that is, have the plans worked out for future expansion, in the way of the additional floor-space required for increased production. This will include a detail layout of every department.

"The safety department consists of a director and area assistants, whose work is mostly educational after all the machines have been properly guarded. A recent analysis of accidents in our plant for a period of one year does not show that accidents are more numerous at any particular hour of the day, nor on any particular day of the week, than on any other. A further analysis shows that 64 per cent of the total number of accidents are to the hands and that 35 per cent of this number are caused by handling stock."

Keeping Lumber Expense at a Minimum Level

Relative merits of salvaging machines topic of considerable discussion among production engineers. Researches outlined.

IN a small but interesting meeting several phases of the lumber question as related to the automobile builder were discussed. From the practical side, B. Nagelvoort of the Towson Body Co. presented a paper entitled "Lumber Problems Encountered In An Automobile Plant." Discussion of this paper centered around the relative merits of the Linderman machine as a means for salvaging otherwise scrap lumber. Although opinions were widely divergent, no agreement or conclusion was reached. H. D. Tiemann of the Forest Products Laboratory described the inherent physical characteristics of wood which have particular effect in producing cracking and checking during the drying period. Both of these papers are digested herewith.

Solving Lumber Problems

—B. Nagelvoort.

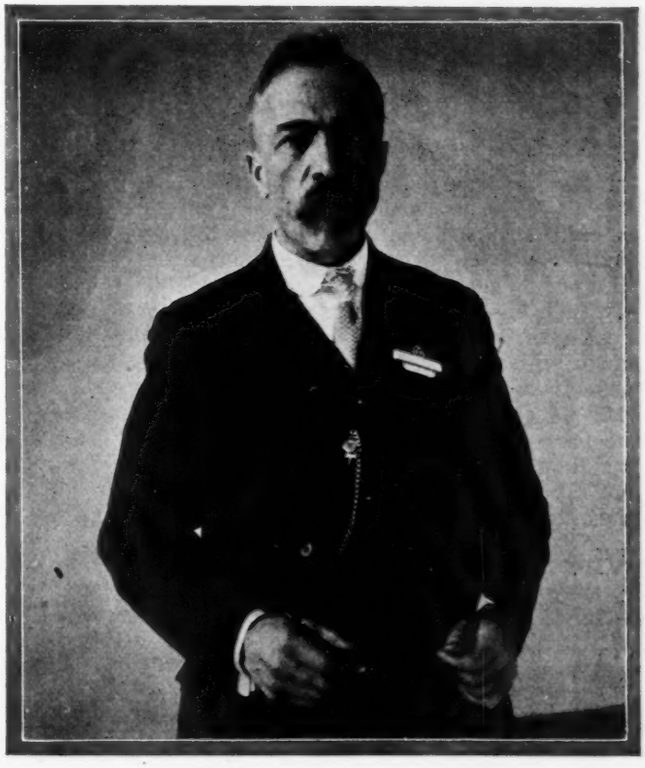
"It is said that under the conventional methods the proportion of board feet in body parts by actual measurements to the wood content of the entire tree is very low. One-third of the tree (the limbs and top) is wasted before the log gets to the mill; only 55 to 60 per cent of the log is actually converted into body parts.

"If it were possible to furnish lumber to the stock sawyer in lengths and widths most suitable for the nesting of his patterns his waste could be reduced to a maximum of 10 to 15 per cent.

"The time has now come when lumber is of such value and common labor demands such wages that it is necessary to economize in handling expense as well as to conserve as much as possible of every board.

"Loads are normally 16 ft. long by 6 ft. wide for cross-piling, and 16 ft. long by 8 ft. wide for end piling. While a considerable proportion of ordinary lumber will be

Outlines Lumber Researches



H. D. Tiemann, Forest Products Laboratory, told the causes of surface cracks and checks in wood

less than 16 ft. long, yet this is the standard, and aisles of 2 ft. or more must be allowed between loads when spacing yard rails.

"The height of loads may extend to 9 ft. above the rails on cross-piling and 10 ft. on end-piling. Higher loads become unstable and do not dry evenly in the kilns.

"A very important function of the operator is to keep an accurate record of the performance of the dry-kilns.

"An apparatus to control the temperature and relative humidity over a predetermined time has recently been placed on the market to assist the kiln operator in maintaining ideal drying conditions throughout the drying period. This instrument regulates the temperature and humidity by means of cams and diaphragm valves actuated by wet and dry bulb thermometers, entirely eliminating the human element.

"Much has been said in the daily papers of the Ford method of cutting hardwood lumber into body parts by sawing them directly from unedged green planks as they come from the log.

"It is also claimed that the Ford method of cutting the parts to rough shape while the wood is still green has simplified the drying process by reducing the spoilage due to warping and end checking very materially and shortening the drying time approximately 10 days."

The Next S.A.E. President

H. L. Horning spoke briefly at the Production Dinner

Why Surface Checks Appear in Wood

—H. D. Tiemann.

"WOOD, like many other organic materials, is highly hydroscopic; that is, it will absorb or lose moisture according to the degree of humidity of the surrounding air, and this is accompanied by swelling or by shrinkage. On account of the peculiarly complex cellular structure of wood, the deformation accompanying changes in moisture content is neither uniform nor isometric. As a general rule it is about fifty times as great in the radial direction of the log as longitudinally, and about twice as great circumferentially as radially. These relationships may, however, become greatly modified in places by changes in the structure of the cell walls. Just how moisture action causes swelling and subsequent shrinking of wood is hypothetical, but all things point to the probability that the characteristic effects are due to moisture entering in between the fibrils of which the cells are composed, by virtue of an attraction called absorption. As the molecules of water are absorbed from the vapor in the air, the fibrils are probably pushed apart, thus causing swelling. The fiber-saturation point occurs at a moisture content of from 22 to 32 per cent of the dry weight of the wood, varying with different species and averaging around 25 or 26 per cent.

Water Content

"Water is thus contained in wood in two forms: as hydroscopic moisture adsorbed in the cell walls, and as free-water occurring in the capillary spaces, with the fiber-saturation point as the division line between the two conditions. Free-water can exist in wood to the point where all the internal cavities are filled completely.

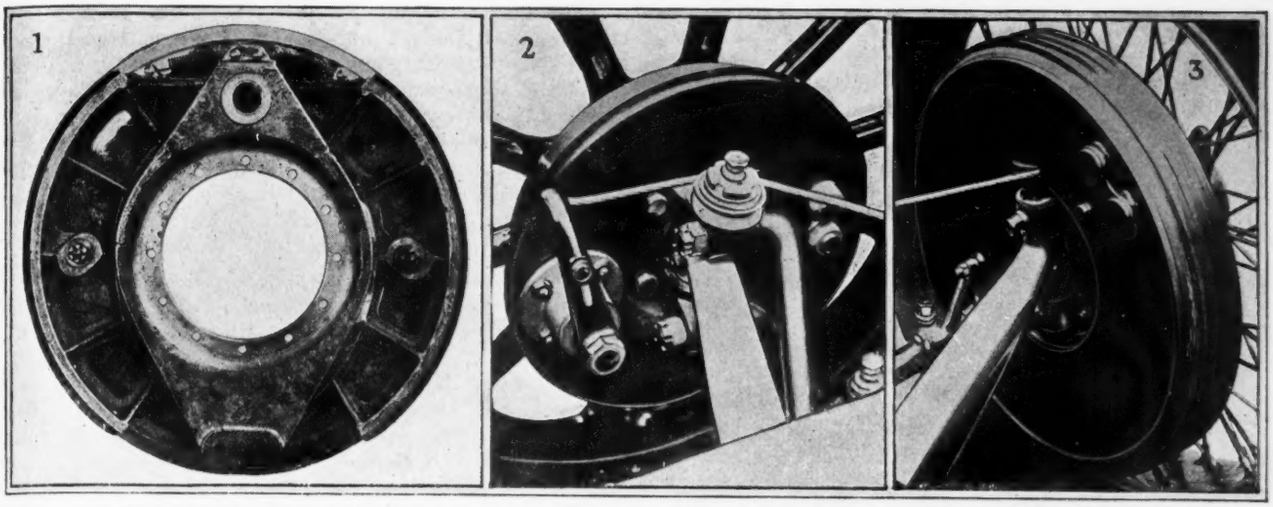
"In many of the species more difficult to dry, such as swamp-grown oak or lowland western red-cedar, a pseudo-shrinkage or sinking in of the block as a whole occurs upon removal of the free-water, provided the cells are completely filled to start with. I have designated this phenomenon as 'collapse.' The effect is produced by a deformation of the cells or a collapse of the side walls, like that of a rubber tube that has been filled with water, closed at one end and the water drawn out from the other.

"As a stick of wood dries, there is necessarily set up a gradation of moisture from the center toward the surface and the outer surface therefore reaches its shrinkage point first. The tendency to shrink is resisted by the wet interior, and the outer surface is thus thrown into a state of tension while the interior is put in compression.

"The degree of these stresses depends upon many physical factors, among which are the original moisture-content of the wood, the rate of transfusion of the water from the center to the surface, the consequent steepness and form of the moisture gradient, the moisture content of the outer surface, the plasticity of the wood substance, the degree of 'setting,' the amount of shrinkage, the tendency to collapse and the strength of the material. Under too severe conditions, both the external tension during the early stages of drying and the final internal tension may easily exceed the strength of the wood, especially while it is still somewhat moist; the result is either external surface-checking or the kind of internal checking called 'honeycombing' or 'hollow-horning.' Or the second state of stress, that of tension inside and compression outside, may be over-accentuated by the kiln treatment and remain unrelieved in the wood after it is dry, to give trouble later by warping or cupping when the stick is machined or glued. These residual stresses constitute 'casehardening.'

"If a casehardened board be resawed through the middle, it is sure to 'cup' with the concave side inward.

"The 'setting' of wood must not be thought of as in any way akin to the setting of cement, because the wood after setting is still free to shrink or swell with further changes of moisture. It appears to be more in the nature of a fixed deformation of the cell shapes, so that the zone in question is rendered either larger or smaller than it would be normally."



1—Delage brake shoes of deep section are made from Alpax silico-aluminum alloy. 2—Detail of front wheel brake on 55 cu. in. Fiat. 3—Cable operated front brakes on new Itala 122 cu. in. six-cylinder model

Four-Wheel Brakes and Fabric Car Bodies Stand Out as Features of French Production

Design forges ahead of production. Uniformity remarkable since each French manufacturer seeks to produce as much of his car as possible within his own factory. 85 per cent of cars are fours.

By W. F. Bradley

ALTHOUGH open to foreign nations, exclusive of Germany, the show now being staged in the Grand Palais at Paris is really 90 per cent French; Italian and Belgian makers are few in number, England has sent only three makes of cars and the United States is represented by thirteen. For more than three years French engineers have been actively developing new designs and last year they reached such a stage that the drawing office had to be slowed down to allow production to catch up with design. As a consequence, most of the models now on exhibition are those which were seen last year, plus detail refinements suggested as a result of one year's experiment and test.

Altogether not more than one dozen entirely new chassis are to be found in the exhibition hall, and several new models are being held back because the strong demand for the existing cars does not justify putting new types into production.

French makers have now reached a uniformity of design which is rather remarkable in a country where every manufacturer seeks to produce as much of his car as possible in his own factory and to use outside parts only in rare cases. Four-cylinder engines are 85 per cent of the whole, with sixes coming next in importance. Detachable heads, unit assembly of engine and gearbox, with the use of aluminum castings for base chambers and gearboxes, overhead valves of the pushrod type gaining ground; magneto ignition on 99 per cent of the total number of cars; central drive with inclosed propeller shaft and a spherical attachment to rear face of gearbox; a diminished number of cars with Hotchkiss drive; a preference for mechanical rather than fabric universal joints; mechanical four-wheel brakes adopted by everybody; balloon tires general up to 5½-in. size and practically none above this size; banjo type pressed steel axles; detail refinements—these are the general chassis features at the show.

122 cu. in. Car Popular

The type of car most in evidence and selling in the greatest numbers is a four-cylinder of 90 to 122 cu. in. piston displacement; the 122-in. engine is considered big enough, under European conditions, to render all the service the motorist can require. The commercial success of the small two and three-seaters with a four-cylinder engine of 45 to 67 cu. in. has been confirmed, this type being the biggest production job of Citroen, Renault, Mathis and Peugeot. Citroen is marketing this type two-seater at $583, this being the cheapest car of its class on the market, and has a two-seater cabriolet which has proved a very good seller at $700. These prices are based on present rate of exchange.

There is a tendency to equip these small cars with four-seater bodies, a good example being a new Berliet, just about to go into production, which has a 62-cu. in. overhead valve engine and a wheelbase of 110 in., giving a length available for body of 89 in. Renault has lengthened the wheelbase of his 58 cu. in. car to 104 in. and is producing it for the first time with a four-seater body. Both these models have front wheel brakes as standard equipment and balloon tires as optional equipment. Right at the other end of the scale Voisin is cataloging two types which he designates "laboratory cars," one a 93 cu. in. four-cylinder sleeve valve with two-seater body costing $4,850, and a bigger four-cylinder Knight of 238 cu. in., with four-seater body costing $6,500.

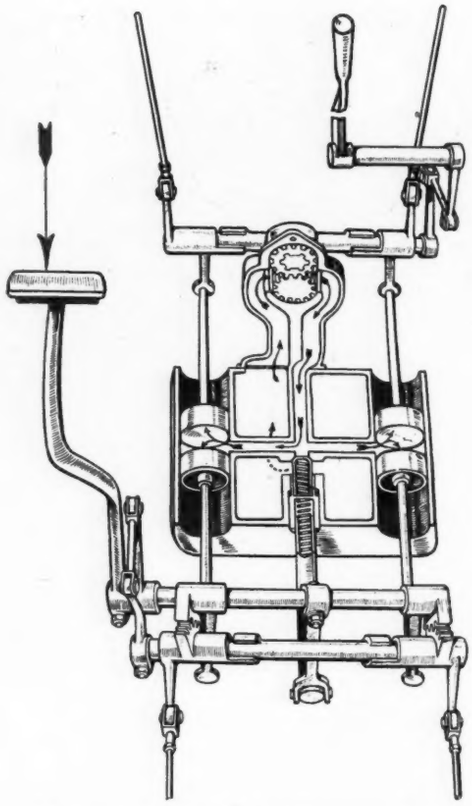


Diagram of Fiat hydraulic servo brake

These are practically duplicates of the machines Voisin prepared for the French Grand Prix touring car race, in which the fuselage body fulfills all the functions of a frame.

Only a few models stand out as entirely new. Fiat has decided to come into the smaller car class and has produced an economical two- and three-seater with a 55 cu. in. engine. This model probably will not go into production until next summer and no price announcement has been made. The changes of design lie more in the engine than in the chassis. The four cylinders are a block casting with the upper half of the crankcase and clutch housing. The valves are inclined in the detachable head and the overhead camshaft drive is by two short chains at the rear, the first chain being to the magneto shaft and the second from this shaft to the camshaft. This arrangement places the magneto on top of the clutch housing, under the toe boards, with the distributor facing rearwards. A four-blade aluminum fan is driven by a flexible coupling from the front end of the camshaft, the oil pump drive is taken from the center of the crankshaft and the electric generator is driven direct off the front end of the crankshaft. Water circulation is thermo-siphon. The starting motor is on the left-hand side of the engine. The short chain drive is interesting in view of the difficulties experienced by European designers in securing silent overhead camshaft drives.

Fiat's Smaller Car Brakes

A four-wheel braking system is used, with a self-wrapping servo mechanism operating in both directions, regarding which no information has been issued. Balloon tires and hollow steel spoke wheels are standard equipment.

Itala has an attractive new six-cylinder chassis of 122 cu. in. piston displacement, for the design of which Engineer Cappa, who established his reputation with Fiat, is responsible. The valves on this engine are inclined in the detachable cast iron head and are operated by inclosed pushrods. The plugs are also inclined in the head at the same angle, and the whole is inclosed by an aluminum cover. Camshaft drive is at the rear, with the tandem-mounted generator and magneto fore and aft on the right-hand side and the water pump rather inaccessibly placed to the rear of the timing gear housing. Flexible metallic hose is used for the water outlet.

The addition of a new model to the Hispano-Suiza line is a concession to the public demand for smaller and lighter cars.

Mathis has come out with a new model with a four-cylinder 98 cu. in. L-head engine having four-seater body and 114 in. wheelbase, to fit the popular demand for a cheap four-passenger car.

While the general brake situation is unchanged, a considerable amount of detail work has been done. Four-wheel brakes are used by every French manufacturer with the exception of Citroen, and his reasons for not adopting them are of a commercial and not a technical order. The hydraulic brake has passed out. The Perrot mechanical brake dominates, the others on the market forming a very small percentage.

Much attention is being paid to the development of servo mechanisms, and indications are that these will come into rather extensive use on all but the smallest and cheapest cars. It is recognized that the effort required to operate four brakes is unnecessarily high for women drivers. Probably some type of self-wrapping mechanism will become general for the cheaper cars, this device being made to operate in both directions and being fitted to the four wheels. Perrot is understood to

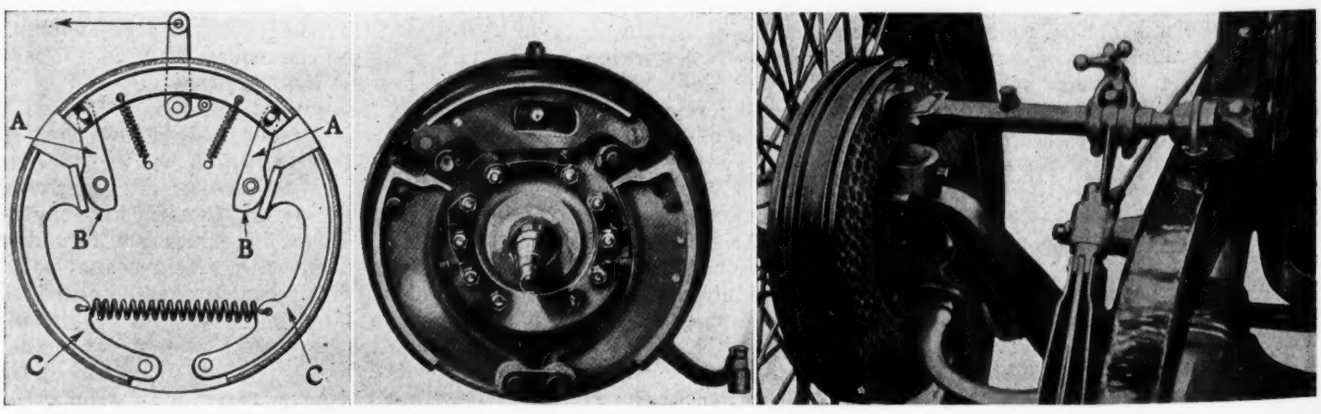
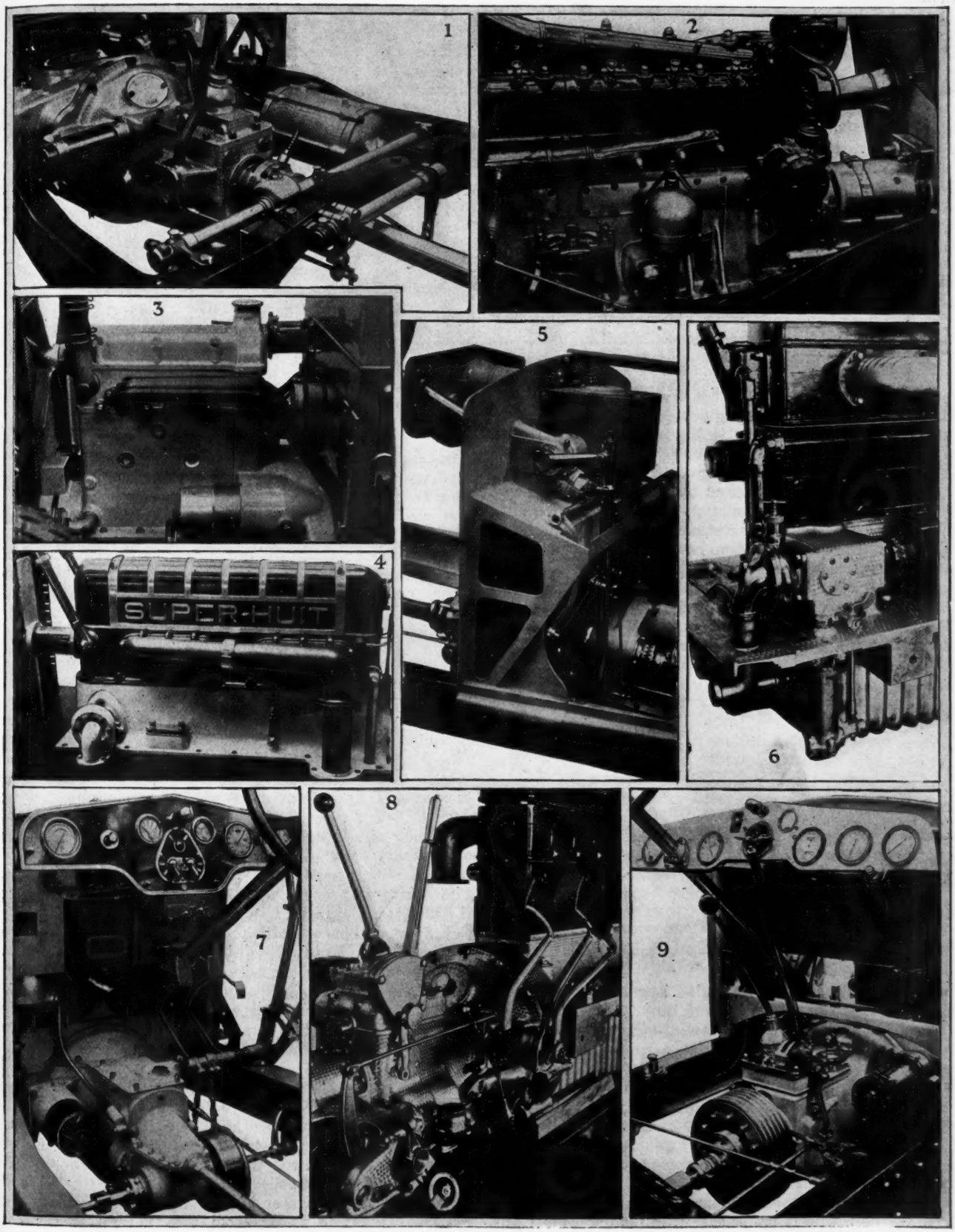


Diagram and photographic view of Eugene Renaux three shoe *Front wheel brake adjustment on Turcat-Mery chassis*

Some Mechanical Features of Paris Show



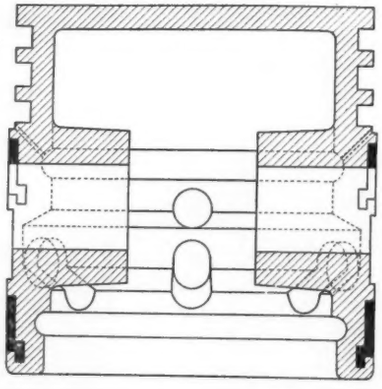
1—Ballot gearbox and brake layout. Dewandre vacuum cylinder at right. 2—Centrifugal oil filter used on large Renault engines, seen in foreground. 3—55 cu. in. Fiat with magneto in rear and fan driven off front end of overhead camshaft. 4—Baron Vialle "super-eight." 5—Two-stage steering gear on Itala six. 6—Delage six has thermostat at jacket outlet. 7—Friction type servo mechanism on 20 hp. Hispano-Suiza. 8—Delage six has hydraulic servo mechanism in bottom of gearbox. 9—Propeller shaft brake on Georges Irat

be about to bring out a new double-acting self-wrapping device.

Rochet-Schneider has taken up, in conjunction with Perrot type four-wheel brakes, a self-wrapping servo invented by Eugene Renaux. As shown diagrammatically, this consists of two brake shoes CC, on separate pivots and occupying about two-thirds of the circumference of the drum, and between these two a third, servo shoe. The servo shoe is slotted at two points and is given a rectilinear movement under the action of a lever and a roller, or by means of an eccentric, which brings it in contact with the drum. Being carried round partially with the drum, the servo shoe applies pressure to the pair of brake shoes through the levers AA and the cams BB, the operation being the same in whatever direction the drum is revolved. As the length of movement of the servo brake control mechanism is independent of the wear of the brake shoes, the adjustment for wear is reduced to a minimum. The big frictional surface obtained with the three shoes diminishes deformation of the drum.

Numerous Servo Mechanisms

In addition to self-wrapping devices, the servo mechanisms in the show are the Hallot frictional type with centrifugal weights, which is used by three firms; the Dewandre vacuum system adopted by Voisin, Ballot and Nagant; a hydraulic type used by Fiat and Delage; and the Hispano-Suiza friction type adopted by Renault, Mors and Delahaye. Only one new firm has adopted the practice of Bignan and Chenard-Walcker of abolishing brake drums on the rear wheels, this being the G. R. P. Company, a firm building a medium-sized chassis for taxicab and general service, and in linking up transmission and front wheel brakes it has increased the diameter of the front wheel drums from 11.8 to 13.7 in.

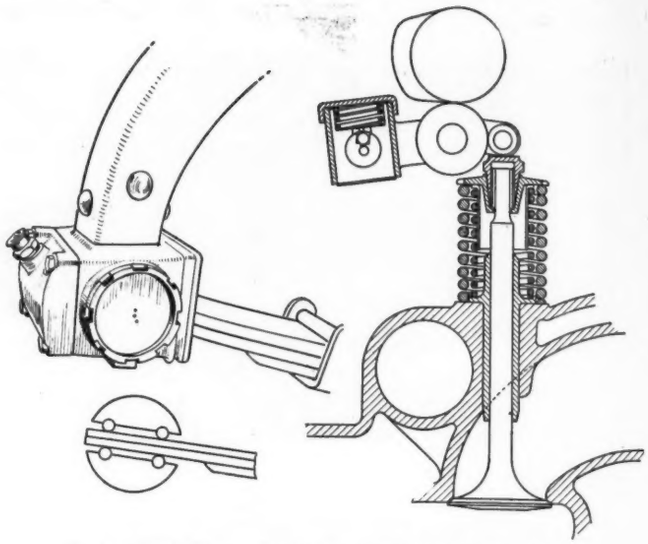


Aluminum alloy piston with two thin cast iron wearing rings cast in

While the overhead valve engine is growing, the overhead camshaft type is increasing only slowly, owing to cost and the immense difficulties attending silent operation. Keeping out of the very high car class, those using overhead camshafts are Ballot, Ansaldo, Metallurgique, La Buire, Delahaye, Rolland-Pilain, Omega (on a new six built by Bleriot and for which Engineer Henry is responsible), Bignan on a 16-valve engine, and Diatto.

Aluminum pistons are used very generally, despite little difficulties which are being experienced with them. The fact that a cylinder bore above 3 in. is rather an exception simplifies the problem somewhat. The exception is Citroen, who is using cast iron pistons on all but sports models.

Alpax metal (Al. & Si.) is coming into more extensive use for pistons. There is a silicon alloy of which an average analysis is: Silicon, 12 per cent; zinc, 0.5 per cent; magnesium, 0.25 per cent, and the rest alumium.



Left—End of two main leaves of spring on Delage six pass between rollers let into semi-circular bronze blocks. Housing is closed by a leather gaiter. Right—Overhead valve gear on same car

Delage is using this metal alone for the pistons of a sports edition of his high grade six, which has a cylinder bore of 3.7 in. and employs the same metal with a screwed-on cast iron skirt on the normal type engine. The two are practically the same weight. On his smaller four cylinder engine Delage is getting good results with an alumium piston having a split cast iron skirt, but these combination pistons are not really common practice.

Duraluminum Connecting Rods

Forged duraluminum connecting rods appear to be limited to Renault, who is making use of them on all his engines with the exception of the smallest, without his users apparently being aware of the fact. Aluminum cylinder blocks are limited to one model, Hispano-Suiza. The Farman Company has just put into production an Alpax metal cylinder block, with liners, in place of forged steel cylinders surrounded by a sheet steel water jacket.

Among sleeve valve engines the only change appears to be that of Panhard-Levassor, who is now using steel sleeves with white metal lining, and Peugeot who has added a second sleeve valve engine to its line, with four 3.1 x 4.8 in. cylinders.

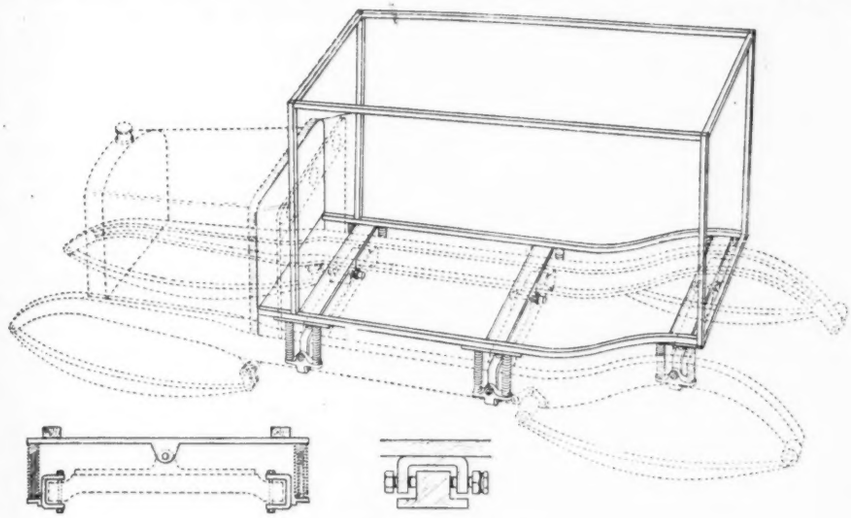
Influenced by competition work, some attention is being given to dry sump lubrication. This is standard practice on Bignan, the pump being driven off the lower end of the vertical shaft operating the camshaft and the oil tank being in front, between the two spring hangers. Alfa-Roméo is making use of a similar system on a sporting type car, the oil tank in this case being under the cowl.

On his overhead valve engine Ballot is making use of two independent feed pumps, one supplying oil to the crankshaft bearings and the other delivering it to the overhead valve gear. Oil level gage, combined breather and filler, and the two detachable filters for each of the oil circuits are grouped on the crankcase. On his high grade six, Delage water-jackets the main oil filter and bypasses the hot water from the thermostat through this jacket for warming the lubricant when starting up from cold. This is one of the very few cars using a thermostat.

Renault has added an oil radiator to his big six, and on this and several other of his bigger models he is

making use of a centrifugal oil purifier. Renault has been led to this by experience gained with truck engines running on charcoal gas. By reason of impurities in the gas it was found advisable to fit an oil purifier, and the use of this has been extended to the ordinary engines. The device consists of a bowl in a housing on the side of the crankcase, running at very high speed in relation to the engine and, by centrifugal force, throwing the heavy particles to the circumference and only allowing purified oil to return through the central pipe.

The practice of covering up all the accessories and



Flexible body mounting of Merville & Garnier

either extending the crankcase webs up to the frame members of fitting sheet aluminum plates to form a flat bench from the engine base to the side frame members has extended considerably. This was limited at the outset to high-grade cars, but it has now been extended to medium and cheap jobs.

Light Alloys for Chassis Construction

Light alloys are beginning to make their appearance for chassis cross-members. Delage is making use of Alpax metal for his central cross frame member, which forms an X and carries the spherical head of the propeller shaft tube. On two of his biggest cars Renault also employs Alpax metal for his central cross frame member. On the big six-cylinder Delage the brake shoes are in Alpax metal.

Hotchkiss drive is losing ground before central drive with an inclosed propeller shaft and a spherical head attached either to the rear face of the gearbox or, on very long wheelbase and expensive cars, to a cross frame member.

Little change has been made in suspension, the two most popular types of rear springs being semi-elliptic and cantilever. Renault is making his 15 hp. model (four cylinders 3.3 by 5.5 in.) in two chassis types, one being normal and the other luxury. The former has an exceedingly broad transverse spring and the latter has diagonally mounted cantilevers. Delage and Diatto are making use of semi-cylindrical bronze blocks and rollers for the attachment of both ends of the rear springs to the chassis. There are two main leaves of equal length, both being received between the semi-circular blocks.

A modification of the practically universal practice of unit powerplant construction is found on the new Chenard Walcker cars. Here the clutch housing is a pressed steel banjo member, with the aluminum engine base chamber bolted to the forward face and the gearbox to the rear face. This constitutes a single unit for factory assembly, but the clutch housing fulfills the function of a cross frame member and has been designed to be left in position in the frame if the engine only has to be removed for repairs.

There has been no practical development of the Lavaud variable transmission, or torque converter. According to its inventor, it has now reached a stage where it can be put into production.

Balloon tires up to 5½-in. section are commonly employed. Above this size there is practically no use of low pressure tires.

Fabric leather is the outstanding feature of the body section of the show. The objectives appear to be low weight and silence rather than comfort, which latter seems to have received attention only in special cases.

Weymann led the way in the use of fabric leathers for panels with his special type of construction in which the seats are set directly on the frame members and the body consists of a wood frame, the parts of which are joined together by angle irons and bolts, with a gap between the two pieces of wood. French automobile manufacturers building under Weymann license are Talbot-Darracq, Mathis and Vermorel; nine body builders are also producing under license. It is apparent, however, that many others have been influenced by Weymann's practice, for the show is full of wood frame-fabric bodies. The claim is made by Weymann that many of these constructions are infringements of his patents and warning has been issued and threats made of legal proceedings.

Fabric leather construction is more commonly employed for closed than for open bodies, although there are quite a number of the latter. Exclusive of the Weymann, there are three general types of construction: plywood panels with fabric leather glued on; aluminum panels with fabric covering, and a skeleton frame with canvas as a base over which the fabric leather is stretched. For open sporting quality cars the plywood construction with glued-on fabric leather is very extensively employed, because of low weight and absence of drumming. Not satisfied with using fabric leather for the panels, some makers are covering the hood, the fenders and the trunk with this material.

Plaids and checker designs are common on these fabric covered bodies, and while the general tendency is toward dark colors, there is a certain percentage of vivid hues.

Among chassis manufacturers Voisin is practically the only one having done original work with a view to body weight reduction and silence. This maker is building very light plywood sedans, with a wood frame, aluminum panels and fabric covering, with a ribbed roof covered with airplane canvas and fabric leather. On a bigger sedan Voisin is using a skeleton frame with an upholstered fabric covering, the fabric being stitched to the upholstery under it.

Citroen's all-metal sedan, which is about to go into production, is at present an American importation. This appears to be the only attempt being made by French makers to reduce the cost of closed car construction. The demand for closed cars is strong.

Latest Cooling System Employs Small Gear Pump with 3/8 in. Discharge Tube

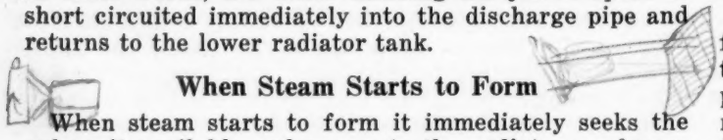
Functions much like steam boiler, but water is cooling medium. If jacket with free outlet and no pockets is used overheating is impossible. Weight saving exceeds 30 lb. in case of one car.

By Herbert Chase

USE of a gear pump of about the size commonly employed in pressure feed oiling systems to force water from a radiator through pipes 3/8 in. or less in diameter and into a cylinder jacket for cooling an engine of average size may sound somewhat impracticable, yet precisely this is being done successfully with three different passenger car engines now in experimental service, under the supervision of S. W. Rushmore.

This is made possible by applying to the automobile engine a few simple engineering truths which long have been applied in steam boilers and are common knowledge among engineers familiar with steam practice. The result is not only a lighter cooling system and a neater appearing engine, but a condition which enables a good working temperature to be attained quickly and maintained practically constant without danger of excessive temperatures or pressures. At the same time trouble due to water in the crankcase is eliminated and dilution of engine oil with fuel is decreased if not entirely prevented.

In one of the engines referred to, the latest model Buick six, the pump delivers water through a 5/16-in. copper tube which enters the cylinder block concentrically with the jacket discharge pipe which is connected to the bottom of the radiator in this case. With this arrangement most of the water in the jacket is stagnant, except for such thermal circulation within the jacket space as is set up normally, until steam starts to form. In other words, the water entering the jacket space is short circuited immediately into the discharge pipe and returns to the lower radiator tank.



When Steam Starts to Form

When steam starts to form it immediately seeks the only exit available and passes to the radiator-condenser along with any excess water pumped, the water turned to steam in the jacket being replaced by a part of that entering from the pump. Since the outlet pipe is carrying only a small part of its capacity for water, there is ample space for steam flow in the same pipe, and the steam does not have to accelerate "slugs" of water on its way to the condenser. Consequently back pressure is almost nil.

Action is precisely comparable to that in a steam boiler. Steam does not collect on the heated cylinder walls any more than it does on boiler tubes, nor is a forced circulation of water necessary to sweep it off. The instant a steam bubble is formed in a boiler it immediately seeks the steam dome, traveling at a very high rate of speed through the water in the tube. If it did not do so the tube would overheat quickly at the point where a pocket of steam had formed, because the outside of the tube is in contact with very hot gases and often receives also much radiant heat direct from the fire.

No forced circulation is required in a boiler and the tubes never reach a temperature more than a few degrees higher than that of the water with which they are in contact. Of course, care is taken to see that no pockets with highly heated surfaces where steam can collect exist in the boiler structure.

An engine jacket is, in fact, a boiler in which the circulating pump is the boiler feed pump. If the pump is arranged, as it is in an ordinary water cooled engine, in such a way as to circulate water continually through the jacket, and if, as usually is the case, the quantity circulated is such that the heat passing through the jacket walls is not sufficient to raise the water to the boiling point and then add the latent heat of vaporization, no steam is formed.

Rate of Circulation

If, however, the rate of flow is limited to an amount such that some water is evaporated, steam will be formed. Now since it requires about forty times as much heat to raise the temperature of a given quantity of water from 160 to 212 deg. Fahr. and convert it into steam at atmospheric pressure as it does to raise the temperature of the same quantity of water from 160 to 185 deg., it is evident that the rate of circulation in the former case (steam cooling) need be only one-fortieth that for ordinary water cooling. This accounts for the small pump and piping now being used in the Rushmore system.

Some engineers have found it difficult to reconcile facts such as these with experience they have had in the use of ordinary water cooled engines, which are prone to show signs of distress when steam is formed rapidly in the jacket, and have jumped to the conclusion that successful steam cooling is impossible. But the development outlined is entirely in line with good steam engineering practice. A water kettle on a hot stove never overheats so long as the surface in contact with the source of heat has water on the other side. The same is true in respect to boilers, as indicated above.

Why, then, conclude that the same conditions do not apply in the case of an engine cylinder? Thousands of portable and stationary engines with water hoppers are in daily use. In these, water simply is allowed to boil away, and nothing happens so long as the cylinder itself remains covered with water. In some cases a radiator placed above the water level and in front of an engine driven fan serves to condense the steam formed and we have a complete steam cooling system. For many years Fairbanks Morse has built an engine with cooling unit of this type.

What happens in the case of conventional water cooled automobiles given to steaming is believed to be about as follows: An improperly designed water jacket or outlet system permits the formation of a pocket of steam.

This steam, due to the pocket or to an inadequate outlet blocked by water which cannot escape with sufficient rapidity, seeks to expand, creating considerable pressure within the jacket. This pressure probably prevents or greatly decreases the flow of water into the jacket, since centrifugal pumps are unable to deliver against much head.

In the meantime the engine continues running, and in the absence of a force flow from the jacket the evolution of steam increases, as does also the pressure. Finally a part of the cylinder wall may be covered with steam which cannot escape, and, of course, this area rapidly increases its temperature and may cause the engine to detonate and show other signs of distress.

If, now, pocketing be prevented by so designing the pump that the discharge pipe is not choked by water entrained by the steam, and if, in addition to this, a positive pump be used which will deliver against considerable pressure if necessary, the overheating conditions outlined disappear. Although steam is generated it flows to the condenser as rapidly as formed. A pressure of two to five pounds may be created, if outlet conditions are not quite as free as might be desired, but the positive pump easily delivers against a pressure much higher than this.

If the system be designed in such a way that the condenser cannot become air bound a wholly practicable steam cooling system is the result. Perhaps it should not be called steam cooling, for in reality steam does not do the cooling. The cylinder always is in contact with water and is cooled by the evaporation of this water.

The comparatively constant temperature conditions which obtain once the water in such a system is heated up are attained without thermostatic valves. Loss of cooling fluid practically is eliminated, a smaller and lighter radiator can be employed, and other savings in weight due to smaller pumps and piping are possible. In the case of one large car a decrease in weight amounting to over 30 lb. is said to have been made.

A common misapprehension concerning steam cooling is that it greatly increases maximum temperatures and pressures in the cooling system. Average temperatures are higher, but the maximum temperature is not increased more than 5 or 10 deg Fahr. at most and actually may be less than in the case of a car given to overheating along the lines indicated above. Pressure can be limited to one or two pounds above atmosphere if desired and never need exceed five or six pounds. In practice it usually runs well below atmosphere, once the air is expelled from the system, due to the partial vacuum resulting from steam condensation in a closed system.

Maxwell Truck Chassis Supplied for Martin-Parry Bodies

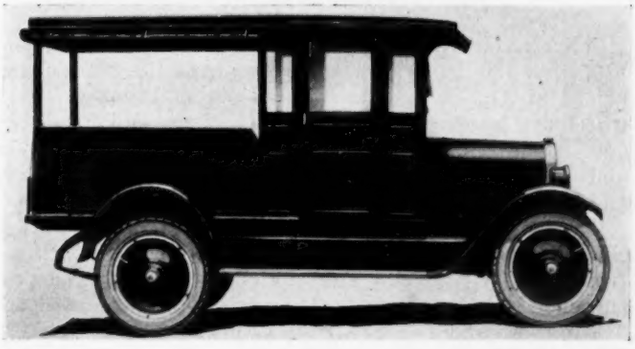
THROUGH an arrangement with the Martin-Parry Co., the Maxwell Motor Corp. has added a light delivery truck in three-body types to its lines. Under the plan of distribution, the Maxwell company will supply a special truck chassis listing at $735 to its dealers who will buy the bodies direct from the nearest Martin-Parry branch. The three-body models, which are of an exclusive design for use only on the Maxwell chassis, are the panel type, the high side express and the low side express. The list price on the panel type is $152 and on the two express types $136.

The truck chassis does not differ from that used for the passenger car except that the rear springs are heavier and stronger, and the gasoline tank is located under the driver's seat instead of at the rear of the frame. Equipment includes front and rear fenders, runningboards, headlamps, nickel radiator, disk wheels, nickel clamping rings, 31 x 4-in. tires, demountable rims, and spare tire carrier.

Bodies have a wood framework with steel panels. They are put together with bolts to facilitate replacement of damaged parts and to permit of keeping the bodies tight thus preventing squeaks and rattles. Anti-squeak material is used between all metal parts and the glass window panels are mounted in rubber.

A weather-tight cab that is easy to get into and out of, is a feature of all three bodies. Doors slide forward on ball bearing carriers and lock in the open position, the lock being controlled by the door handle. The windshield is a two-piece ventilating type giving clear vision and in addition there are glass panels on each side forward of the doors so that the driver can see on both sides. Glass window panels in the doors can be dropped when ventilation is desired. Seat cushions are upholstered and are of the individual type so that the gasoline tank can be filled without the driver leaving his seat.

Body floors are of a non-warping, dustproof design.

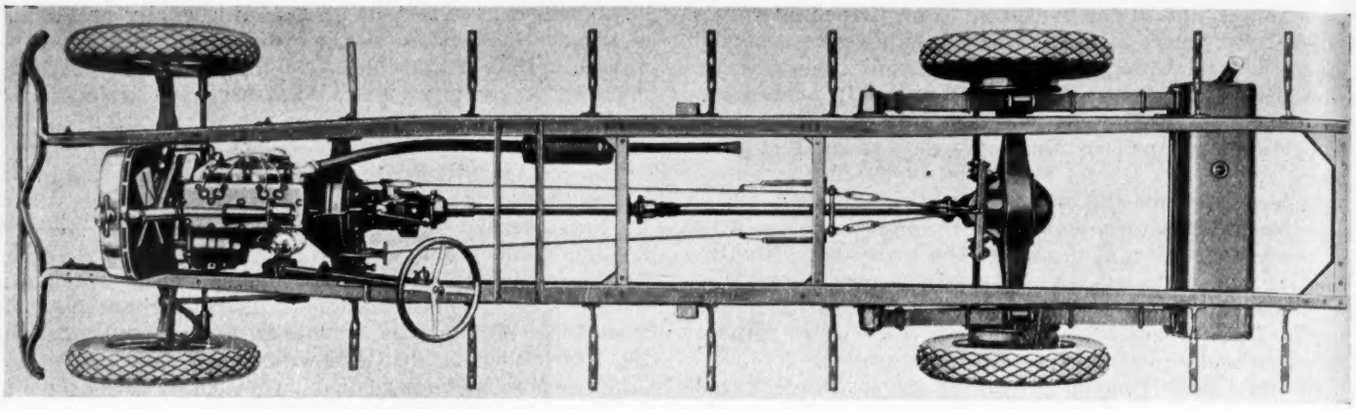


Maxwell chassis with Martin-Parry high side express body

Small gaps are provided between adjacent planks to provide for expansion. These spaces are covered by metal loading strips having flanges along each edge, and are bolted in place. In loading or unloading, the cargo slides on the flanges and consequently does not catch on the bolt heads. Tops are made of wood strips and covered with rubberized fabric.

In panel type body, which is intended to meet the delivery service needs of such retailers are grocers, butchers, florists, etc., an oval medallion is pressed into each side panel, to carry the owner's name. On the inside, the walls are protected by slats. Rear doors are provided with a patented locking device.

Adjustable braces are fitted at each side of the rear of the body so that the body can be brought back into alignment should it get out of true in service. The two express bodies are fitted with back and side curtains, and tail gate. They differ from each other only in the height of the sides which are 10 in. in one case and 20 in. in the other. The load capacity of the truck is about 1000 lb.



Graham Brothers new bus chassis which is similar in most respects to that of the new 1½-ton chassis of the same make. Engine is standard Dodge Brothers unit

Graham Brothers Introduce One-Ton Truck and Two New Bus Chassis

Latter are similar to 1½-ton model, which is continued, and have 140 and 158 in. wheelbase. Sedan and pay-enter type bodies seat 13 to 20 passengers. Brakes have interchangeable connections.

By Donald Blanchard

GRAHAM BROTHERS are now in production on a new 130-in. wheelbase, one-ton capacity truck chassis priced at $1,175, and on bus chassis in 140 and 158 in. wheelbase lengths listing respectively at $1,550 and $1,640. The 1½ ton capacity chassis is continued in 140 and 158 in. lengths, the respective prices being $1,375 and $1,425.

The new truck chassis has a gross load capacity, including cab and body, of 2750 lb., and a speed rating of from 25 to 30 m.p.h. The engine, which is three point suspended, is the standard Dodge Brothers unit with 3⅞ in. bore and 4½ in. stroke. Fuel is carried in a 12½ gal. tank located under the driver's seat and is fed to the carbureter by a Stewart vacuum system. Electrical equipment includes a North East distributor with automatic advance and a 12-volt starter-generator unit.

Clutch and gearset are mounted with the powerplant. The former is a dry multiple-disk type and the latter a three-speed, selective unit. Power is transmitted through a tubular propeller shaft with metallic universal joints at either end. The construction at this point differs from the 1½-ton chassis which has a two-piece propeller shaft with three universals and is centrally supported from a frame cross member.

The rear axle is semi-floating type with helical bevel gears providing a reduction of 5.1 to 1. It is similar to that used in the 1½ ton model except that, instead of having the pinion shaft mounted in a separate member which bolts to the axle housing, it has this shaft supported by the differential carrier. As in the larger axle, this shaft is straddle mounted in ball bearings and the axle shafts are supported by taper roller bearings at both ends.

Frame side rails are flat and have a depth of 6 in. and a thickness of 3/16 in. Semi-elliptic springs of alloy steel are used front and rear. The former are 37 in. long, 2 in. wide and have eight leaves. They are located directly under the side rails. Rear springs are 46¾ in. long, 3 in. wide and have seven leaves. They are hung from brackets riveted to the sides of the frame channels. The steering gear is a worm and wheel type with 17 in. steering wheel. Wheels are of the artillery type with wood felloes and are fitted with 33 x 5 in. pneumatic tires on demountable rims.

Both service and emergency brakes act internally on 16 in. drums at the rear wheels. The brake bands, which are located side by side in the drums, are each 2 in. wide and the linkages operating them are arranged so that either set can be used for service and the other for emergency.

How Brakes Are Arranged

Brake shafts are supported at their outer ends in the brake covers and at their inner ends by brackets bolted to the axle housing, graphite impregnated bronze bushings being fitted at both points. The outer set of brakes are operated by a shaft located inside the tube which operates the inner set. The levers on the corresponding shafts are connected by equalizer bars. The pedal and hand lever are linked to idler levers supported by brackets on a frame cross member by rods, and these levers are in turn connected to the equalizer bars by rods provided with turnbuckles. When it is desired to interchange the brakes, it is simply necessary to reverse the connection of the latter rods to the equalizer bars.

Equipment on this chassis includes flat back shroud with pressed steel instrument carrier; instrument board with speedometer, oil gage, locking ignition and lighting switch, ammeter and carbureter dash control; front and rear fenders, full length running boards and splash shields; front bumper; tire carrier and rim under rear of frame; electric horn; tools; grease gun; electric head lamps with dimmer, combination tail and stoplight, and

dashlight. Nickel radiator shell and disk wheels are optional equipment at additional cost.

Five bodies are furnished on the one-ton chassis. They have a wooden framework with steel panels and are finished in gray Duco. Prices are as follows: Express, $1,345; Stake, $1,385; Canopy, $1,380; Screen, $1,415; Panel, $1,445. These prices are with open cab, the closed type being furnished at an additional cost of $30.

The bus chassis closely resembles the 1½ ton truck. It has special rear springs which are more resilient than those used in the truck. Steel spoke wheels and 32 x 6 in. pneumatic tires on demountable rims are regular equipment. The gas tank is hung from the frame at the rear instead of being carried under the driver's seat as in the truck. Full length running boards and splash guards also are furnished on this model and power tire pump, nickel radiator and spring bumper are included in its equipment. An option between the standard 6.3 to 1 rear axle reduction and a 5.5 to 1 reduction is also offered on the bus chassis. The top of the frame is flat and is 26 in. off the ground.

Prices and body styles offered with this chassis follow:

13-pass. sedan	$3,340	140 in. wheelbase
17-pass. street car type	$3,390	
17-pass. sedan	$3,640	158 in. wheelbase
20-pass. street car type	$3,290	

Sedan bodies have a wood framework with steel panels below the belt line and black Fabrikoid above. The roof is of the soft type with Fabrikoid covering. The seat and back cushions are upholstered in black leather with a glossy finish. All other interior surfaces are finished in black Fabrikoid below the belt and gray above. The windshield is a two-piece ventilating type and the side windows are of the frameless type sliding in felt channels and operated by regulators. The electrical equipment includes push buttons at each seat and two dome lights. A large exhaust heater is installed under the second seat and there are three ventilators in the roof. The finish on these bodies is dark blue Duco.

Details of 13-Passenger Sedan

In the 13-passenger sedan, there are five cross seats. The operator's seat is offset and beside him there is room for two passengers. The second and fourth seats extend the full width of the bus and can carry four passengers each. The third seat is divided on the right side to give access to the fourth seat through the door to the third. In the rear compartment there is no seat and the floor and sides are protected for carrying baggage. The spare tire is also carried here. Entrance to this compartment as well as to the drivers', second and third seats, is through side doors.

The layout of the 17-passenger sedan is substantially the same except that the rear compartment is fitted with a seat and is reached through a division in the fourth seat. A baggage compartment of the trunk type with full width doors is built into the rear of the body, use being made of the space under the rear seat. In addition to this compartment, there is space under the second, third and fourth seats for the storage of small parcels. This body is fitted with a nickel-plated rear bumper.

A glass partition to divide the two rear seats off for a smoking compartment is offered as optional equipment at additional cost.

Entrance to the 17 and 20-passenger street car type buses is through double folding doors at the driver's right. The upper panels of these doors are of clear glass and the lower of wire glass. In the smaller body there are three double seats on each side of a center aisle with full width rear seat. Seats have deep cushions with leather upholstery. Aisle width is 16 in. between cushions and 20 in. between seat backs. The 20-passenger body is basically the same as the 17-passenger type but, as its seats are rattan upholstered, which permits a closer arrangement, four double seats are installed on each side of the aisle.

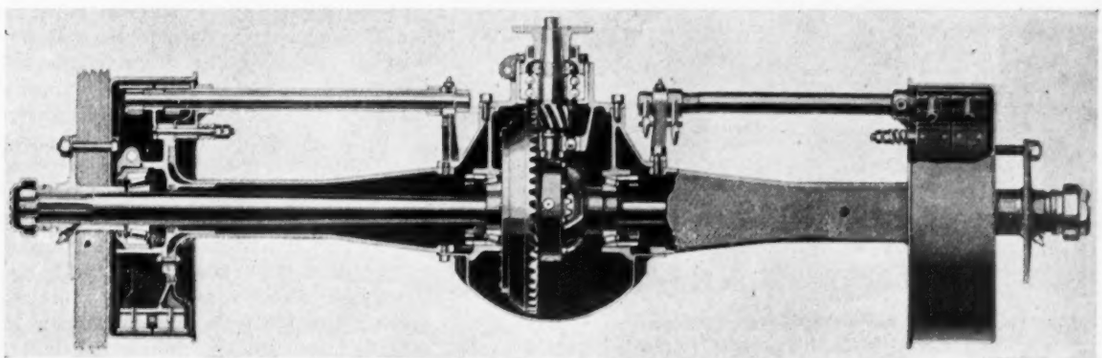
Doors, Windows and Other Equipment

Windshields are of the same type used in the sedan bodies and are equipped with automatic wipers. An emergency door, operated from the inside only, is provided at the left side of the body at the rear. Windows are mounted in felt channels and are operated by counterbalanced regulators. Screen window guards are provided along the sides of the body and are mounted so that they are easily removable for cleaning. Guards also are provided for the rear windows.

Electrical equipment includes red and green running lights above windshield, route sign with lamps all inclosed in a case convenient to the driver, head lamps with dimmer, four dome lights and combination tail and stoplight. Advertising racks are provided above the windows on each side and across the back. Flush type exhaust heaters are installed front and rear. The top is made of tongue and groove slats coated with white lead and covered with duck.

Internal emergency and service brakes now are used on the 1½-ton truck chassis as well as on the bus model. Brake drum diameter is 16 in. and the band width 2½ in. Rear springs have been increased in length from 46 in. to 56 in., this also being the length of the rear springs on the bus chassis. The width is 3 in. in each case, but the truck springs have nine leaves while those on the bus have ten. An option of 30 x 5 in. tires front and 32 x 6 in. rear now is offered on the 1½ ton truck.

"ENGINEERING in American Industry" by Conrad Newton Lauer has just been published by the McGraw-Hill Book Co., Inc. It is profusely illustrated with maps, graphs and pictures and is a general survey of the development of industry in the United States over a period of 120 years. It may be obtained from the publishers for $2.50.



Graham Bros. 1½-ton truck axle which is also used on the new bus chassis

New Hollow Spindle Lathe for Crankshafts Reduces Overhang to a Minimum

Ruggedness of construction said to permit extra heavy cuts to be taken simultaneously with both front and rear tools. Enlarged hollow spindle permits telescoping work inside the headstock.

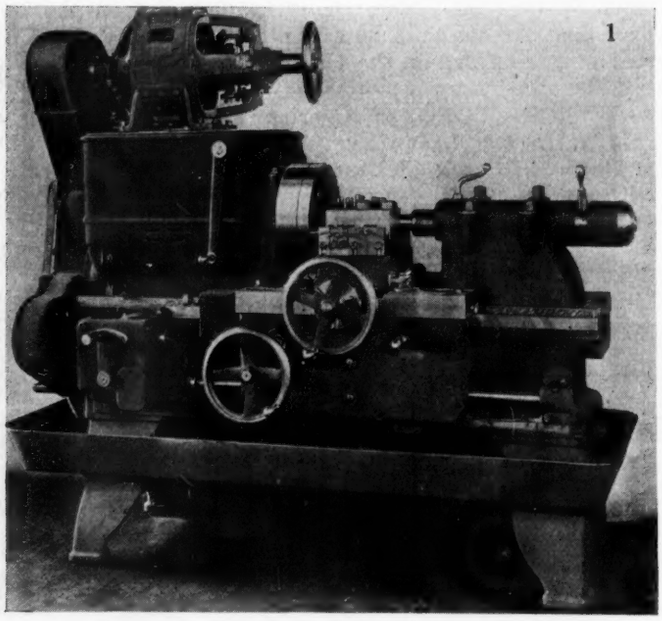
SPECIALLY adapted to the machining of crankshafts and similar parts, as work can be driven close to the portion being machined. Machine described and tooling for crankshaft operations illustrated. Head stock lubrication by splash.

A hollow spindle lathe which is well adapted for certain automotive manufacturing operations has been developed by the Reed-Prentice Co., Worcester, Mass., and a photograph of the machine is shown in Fig. 1.

The enlarged hollow spindle construction permits the telescoping of work inside of the headstock, and of completely machining the extended portion of the work with a chuck drive close up to the portion being machined. It is claimed that the ruggedness of construction allows a series of extra heavy cuts to be taken at one time with both the front and rear tools, as presented in the machining of crankshafts, armature shafts, and such work in which it is of advantage to reduce the amount of overhang of the work to a minimum.

Fig. 2 shows the method of machining the flange end of a crankshaft. The shaft is supported between the head and tail centers and driven by a special chuck gripping on the crankpin directly adjacent to the portion being machined. The hollow spindle construction in the headstock provides for the complete telescoping of the crankshaft, thereby furnishing a substantial support to the work, and placing the chuck driver directly on the spindle flange with a minimum of overhang.

In the illustration shown, the rear tools turn the flange bearing and its shoulder, as well as the outside diameter of the flange, while the front tools face the surfaces shown. By the use of a special rear slide construction, the burden of the cutting is taken with the down pressure on the front block, and both the front and rear tools operate simultaneously.



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Enlarged hollow spindle machine which permits telescoping work inside the headstock

The chuck is arranged with a large opening that permits the work to be readily loaded, while the sliding bellmouth sleeve inside of the hollow spindle locates the work on the headstock center.

Fig. 3 shows an arrangement for machining the small end of the crankshaft. In this case also, the work is telescoped in the hollow spindle and driven close up to the portion being machined. The rear tools perform the turning operation, while the front tools do the facing.

Machining Center Bearing of Crankshaft

Fig. 4 shows the layout for machining the center bearing of the crankshaft. The chuck drives the work by the crankpin adjacent to the center bearing. The rear tool turns the diameter, while the front tools face the cheeks and round the fillets at each end of the center bearing. It will be noted that the heavy pressure of the facing of the cheeks is taken in a downward direction on the front tools.

The lathe is entirely automatic in its cycle of operation, including the control of diameters and length of the work. All handles are centrally located, giving ease of manipulation and rapidity in the loading of the work.

The headstock is of box construction, arranged with a large hollow spindle having an adjustable center for accommodating various lengths of work. The hole in the spindle is of sufficient size to allow all standard makes of automobile crankshafts to be satisfactorily telescoped. The drive is through a disk clutch and brake located at the rear of the head and operated by a hand lever at the front of the headstock. This disk clutch and brake provides for quick starting and stopping of the spindle.

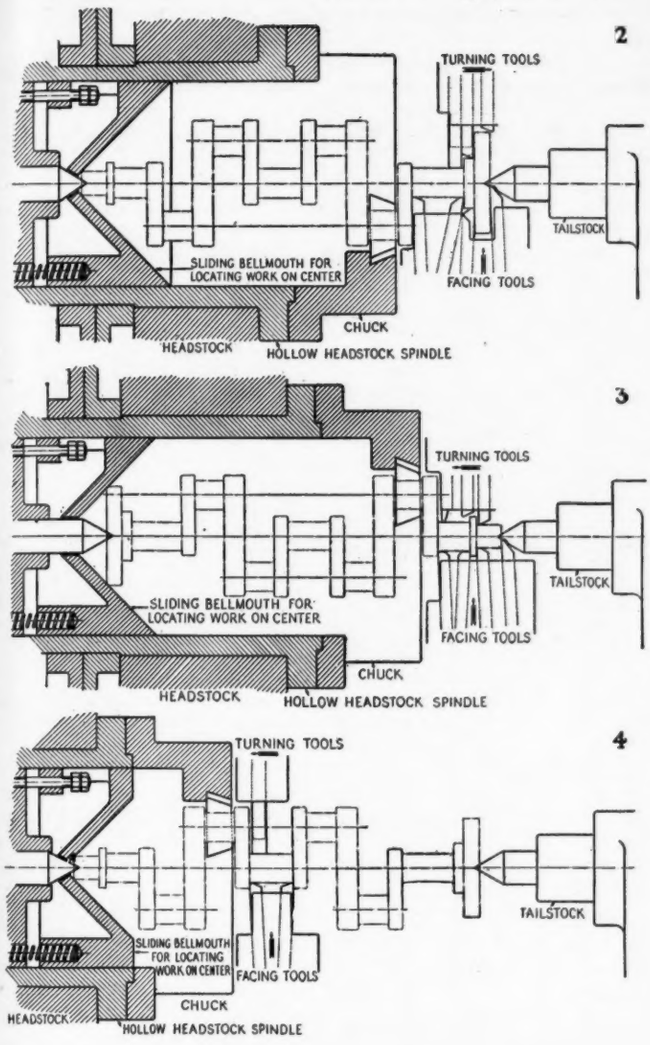
Headstock Gears Herringbone in Type

The headstock gears are of the herringbone type, and of hardened steel, providing for smooth power transmission to the spindle. The gear shafts in the headstock, with the exception of the spindle, run in ball bearings.

The headstock can be furnished with either a belt or motor drive. The illustration shows it arranged for herringbone gear-connected motor drive with all gears running on ball bearings. The motors used range from 5 to 20 hp. depending upon the class of work.

The cam tailstock provides for quick withdrawal of the tail center, as well as fine adjustment of the center in the work.

The carriage is heavy throughout, and the carriage bridge is supported on a right angle bearing inside of the bed, directly under the front tools. The apron is arranged with independent power longitudinal and cross feed, either of which may be engaged separately. Both



Showing details of method of machining various sections and parts of crankshafts

the longitudinal and cross feeds are automatically operated and tripped in both directions, the direction of the feed being determined by the position of the land lever projecting from the front of the apron. The change-over from longitudinal to cross feed, and vice versa, is obtained by a pull gear controlled from a handle protruding from the front of the apron.

A plain T-slot block is regularly provided, and operated by the cross feed screw. For special work, front and rear blocks of various types are often required.

The facing and chamfering operations are usually obtained through the use of the Reed-Prentice patented back arm attachment provided with sensitive worm adjustment for the relationing of the tools to the work.

The feed box regularly furnished gives four feeds, and by compounding the standard gears constituting the end works, three additional feeds may be obtained. The changing of the feed in the gear box is accomplished through sliding hardened steel gears operated by a crank handle at the front of the box. A simple reading index plate shows the position of the handle and gears.

The entire head stock is lubricated through a splash system, and the sight feed oiler shows the level of the oil at all times. All of the apron bearings are oiled from pipe connections to an oiler at the top of the carriage while the feed box bearings are lubricated from pipe connections to the top of the box.

How to Find the Machinability of Materials

A METHOD for determining the machinability of different materials has been worked out by Professors Kessner and Heyn in Germany. A drill press is used, and the depth to which a drill of given characteristics penetrates during 100 revolutions when subjected to a given load is taken as the index of machinability.

A recording pencil automatically draws a "curve" whose ordinates are the number of revolutions and whose abscissas are the depth of penetration of the drill. The test is based on the consideration that for a definite load the depth of penetration will be greater in proportion to the machining qualities of the material. The inclination of the "curve"—which in the case of an homogeneous material and uniform temperature condition is a straight line—represents the machinability.

Commenting on the above described testing method, a writer in *Mechanical Engineering* says that while he appreciates the efforts of these experimenters to reduce machinability to numerical values, the application of the method in practice will fail to give true values, because (1) the hardness of the drill used is a most variable factor, (2) the durability of the cutting edge is a variable controlled by the hardness or the resistance offered by the material being cut, and (3) the cutting angle of the drill cannot be the same for all materials, as different cutting angles will give a longer or shorter life to the drill and will also cause it to cut more efficiently on one material than on another.

Light, Compact Polishing Machine Developed

LIGHT weight and compactness are the outstanding characteristics of the pneumatic Sandown Polishing Machine which has been developed by the Coffelt Rotary Engine Co. of 1117½ West Third Street, Dayton, Ohio. As illustrated, this machine weighs about 3 lb. and the head is approximately 3½ in. in diameter, the shape being roughly circular. Ordinary air pressure of around 75 lb. drives the composition impeller at 2000-3000 r.p.m. and therefore produces the same number of oscillations of about ⅜-in. magnitude.

Operation is controlled by a button valve which acts on the air line inclosed in the tubular handle, a hose connection being located just inside the outer end. The oscillating head is provided with clamping plates for the retention of blocks of felt, abrasive or other desired working mediums. Construction is extremely simple as the working parts consist only of the impeller of Bakelite or other composition and the oscillating slide. It is also intended to provide additional heads for driving drills or screw drivers.

New air-driven polishing machine which weighs about three pounds, has additional heads for screw driver, etc.

Exports of Cars, Trucks and Tires for

COUNTRIES	GASOLINE PASSENGER CARS								TRUCKS						ELECTRIC VEHICLES	
	Up to $500		$500 to $800		$800 to $2000		Over $2000		Up to 1 ton inc.		1 to 2½ tons		Over 2½ tons			
	No.	Vaue	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Europe																
Austria																
Azores and Madeira Islands	21	$8,064	1	$765	1	$1,272			2	$1,529						
Belgium	10	4,227	29	23,310	50	63,065	2	$4,683			1	$829	1	$10,000		
Bulgaria																
Czechoslovakia																
Denmark			9	7,520	4	4,980					4	4,658				
Esthonia																
Finland	2	560	8	4,604					8	3,968						
France	5	2,480	4	2,977	14	17,454	9	25,076								
Germany	7	3,225	32	22,584	14	16,296	11	27,201								
Gibraltar											1	1,111				
Greece	5	2,350	5	3,451	9	10,637	3	4,737			1	2,686				
Hungary			1	698	1	983										
Iceland and Faroe Islands																
Italy	343	92,053			2	2,446			400	99,777						
Latvia					2	2,062										
Malta, Gozo and Cyprus Islands	9	3,320														
Netherlands	9	4,745	35	27,558	37	51,035	10	29,602	1	833	2	2,250				
Norway	3	1,219			2	2,533										
Poland and Danzig					3	3,201										
Portugal	8	3,625	11	8,649	22	27,203										
Rumania	6	2,850	6	4,636	8	7,818										
Russia	25	7,600							1	385	25	10,200				
Spain	86	39,308	44	32,230	165	198,114	7	18,750	1	1,030	7	7,542				
Sweden	44	18,130	54	40,752	40	44,245	8	20,948	2	2,080	22	21,962				
Switzerland	6	2,731	11	7,228	18	21,941	3	6,928								
Turkey			2	1,969	4	4,622										
Ukraine																
England	181	84,846	185	125,641	150	177,966	21	83,090	154	90,557	42	47,224	5	9,662		
Scotland			24	13,956	1	1,150					6	6,156				
Ireland	8	1,800	8	5,984	8	7,510										
Yugoslavia, Albania and Fiume					3	3,787										
North and South America																
United States																
Canada	170	37,860	235	162,991	374	428,646	47	138,284	21	13,879	57	81,714	9	30,190		
British Honduras																
Costa Rica	3	1,539	1	844					2	921	1	2,101				
Guatemala	1	400			17	18,225			4	1,584	2	3,774				
Honduras	3	1,075			1	1,202										
Nicaragua	2	864	3	2,313	2	2,097										
Panama	14	6,091	10	6,936	14	16,146	2	5,085	5	1,920	3	5,011			13	$21,833
Salvador			6	4,624	11	13,756	2	5,760			2	2,576				
Mexico	496	162,796	111	74,786	197	203,775	17	65,655	170	70,013	13	22,016			3	3,292
Miquelon, Langley and St. Pierre																
Newfoundland and Labrador	2	880	3	2,093	3	2,912			2	700						
Barbados			2	1,100	5	7,519			2	712						
Jamaica	7	2,682	11	8,580	8	7,992	2	4,366	13	4,628	2	3,365	1	1,672		
Trinidad and Tobago	5	2,175	3	2,187							4	5,790				
Other British West Indies	11	3,717			1	1,100			5	2,622						
Cuba	692	227,883	62	43,329	129	143,213	19	57,331	122	31,136	12	18,086	4	13,357		
Dominican Republic	52	20,935	13	9,786	19	21,395	1	2,524	12	5,388	2	3,194	2	6,000		
Dutch West Indies	3	1,262	1	742					2	764						
French West Indies																
Haiti	7	3,569	7	5,302	7	8,578			9	5,875	1	1,297	1	3,400		
Virgin Islands	3	1,418														
Argentina	386	181,027	247	168,755	251	291,368	17	52,823	22	17,656	19	31,214	19	53,949		
Bolivia			9	7,018	1	1,693							4	19,760		
Brazil	358	108,847	81	63,648	171	193,813	12	37,074	119	29,396	1	2,600				
Chile	174	37,535	22	16,872	82	105,560	10	30,657	70	42,716	13	19,776	5	7,500		
Colombia	20	7,738	3	2,346	21	21,667	1	3,835	11	3,968	12	14,811	9	34,973		
Ecuador	18	8,120	4	3,120	18	23,558					1	1,351				
British Guiana			1	695												
Dutch Guiana					2	1,838										
French Guiana	1	361							1	452						
Paraguay	7	2,611			2	2,892										
Peru	40	15,238	26	18,787	50	60,567	5	14,311	31	11,575	26	25,014	3	12,287		
Uruguay	72	25,106	48	33,669	68	74,683	1	3,637	102	25,531	5	11,014	2	7,083		
Venezuela	77	29,691	18	13,749	23	28,487	2	6,655	37	15,388	7	15,670				
Asia																
Aden					1	1,110										
British India	36	19,016	125	90,800	76	85,285	1	2,525	27	19,848	8	9,216				
Ceylon	12	5,750	4	2,922	13	13,183			6	3,573	9	13,423	4	5,014		
Straits Settlements	6	3,042	14	9,039	18	20,555					2	3,710	1	2,665		
China	52	21,474	35	26,942	30	33,777	2	6,165	42	17,909	6	7,938				
Chosen																
Java and Madura	14	7,287	35	27,243	20	22,056					6	6,507				
Other Dutch East Indies			15	10,200	5	6,359										
Far Eastern Republic																
French Indo China																
Hejaz, Arabia and Iraq	24	7,560			2	2,401										
Hongkong	25	9,190	5	3,537	2	3,160										
Japan	27	12,606	26	18,474	60	71,501	6	19,481	2	2,909			4	13,592		
Kwantung	11	5,264	8	6,405	1	1,773			5	6,202						
Palestine and Syria	52	17,492	10	7,649	16	20,169										
Persia	10	2,960														
Philippine Islands	37	13,240	19	14,212	50	54,169	1	4,100	45	18,450						
Siam	3	1,300			3	2,969										
Oceania																
Australia	1,240	484,754	877	574,408	741	853,439	135	301,629	117	56,005	145	223,533	63	114,493		
British Oceania			1	513												
French Oceania																
New Zealand	105	50,445	174	125,499	169	205,607	10	28,623	10	9,748	32	54,762	15	29,725		
Other Oceania																
Africa																
Belgian Congo	3	1,092														
British West Africa	4	2,072			5	5,930			14	12,339	32	34,280				
British South Africa	150	71,809	176	143,912	291	303,084	3	9,658	15	9,299	3	6,400				
British East Africa	25	10,534	8	6,118	15	15,096	1	3,847	2	1,171						
Canary Islands	5	1,900	8	6,041	18	19,402			2	373	1	1,075				
Egypt	24	9,819	11	5,991	2	2,148			4	2,000						
Algeria and Tunis	6	2,192							2	816						
Other French Africa	11	3,928	1	618					7	2,482	12	13,657				
Morocco	29	11,311							6	2,448						
Portuguese East Africa	1	518	5	3,733	2	2,310										
Other Portuguese Africa	2	900	3	2,448	2	2,319			2	966	8	7,192				
Spanish Africa																
Total	5,316	$1,952,041	2,956	$2,075,489	3,577	$4,101,600	371	$1,025,040	1,639	$653,551	558	$756,685	152	$375,322	16	$25,125

August, 1924 — Canadian Exports

PARTS	TIRES						PASSENGER CARS						TRUCKS		PARTS	COUNTRIES
	Casings		Inner		Solids		Up to $500		$500 to $1000		$1000 and over					
Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value	
																Europe
$99																Austria
68,884																Azores and Madeira Islands
258,227	686	$9,639	299	$653					7	$4,858					$1,225	Belgium
404	40	391	70	103												Bulgaria
974																Czechoslovakia
188,384	2,390	28,554	897	2,244	116	$3,405	50	$18,491							89	Denmark
28																Esthonia
6,366	622	11,197	700	1,410	24	954										Finland
233,520	247	4,440	37	91			1	433	4	2,740	1	$1,087				France
6,855	614	9,007	541	1,048	11	229									2	Germany
																Gibraltar
5,693	557	7,809	589	1,032	286	8,530									8	Greece
235	30	377	69	118												Hungary
72	42	638	83	158												Iceland and Faroe Islands
83,856	1,669	20,650	666	861												Italy
91	10	57	29	41												Latvia
749	23	208	40	57											56	Malta, Gozo and Cyprus Islands
104,533	2,461	32,177	1,138	2,403	49	1,29[illegible]									676	Netherlands
9,534	1,727	23,996	1,746	2,785	42	1,451									22	Norway
615	196	2,777	392	800												Poland and Danzig
5,869	49	598	26	29	2	50	3	1,374								Portugal
2,066	20	194														Rumania
2,453	103	1,667	113	215												Russia
49,738	542	10,500	914	1,901	62	2,412									118	Spain
13,088	7,531	116,047	7,090	14,563	138	5,796			4	2,580					76	Sweden
4,245	271	8,127	198	928												Switzerland
2,663																Turkey
	40	407	40	64												Ukraine
325,636	16,044	186,782	9,901	15,933	3,399	53,749	323	124,619	164	133,388	56	65,593			32,159	England
2,061	108	1,621	65	100	85	2,333										Scotland
119,955	259	2,477	439	505											1,441	Ireland
1,894	30	276	100	126												Yugoslavia, Albania and Fiume
																North and South America
							13	2,621					1	125	6,407	United States
880,972	1,841	35,993	1,771	4,746	286	10,294										Canada
306	22	230	15	39												British Honduras
961	107	1,687	180	431					3	2,618						Costa Rica
2,514	125	1,877	109	203							1	1,311			8	Guatemala
2,543	100	2,455	91	299	42	2,143										Honduras
433	10	82	53	119												Nicaragua
9,138	1,270	14,648	465	1,129	14	283										Panama
2,035	178	3,692	374	885					2	1,408						Salvador
94,189	4,733	62,452	6,753	12,891	145	4,278			21	20,182	13	16,552			142	Mexico
25	2	22													226	Miquelon, Langley and St. Pierre
1,653	107	1,414	234	344			12	4,013					1	2,050	1,501	Newfoundland and Labrador
2,130							2	941	2	1,518					15	Barbados
13,577	147	1,807	317	622	117	1,803	2	986	2	1,017					78	Jamaica
4,681	148	1,904	122	174											550	Trinidad and Tobago
3,582	142	1,132	129	303	3	49	2	890	1	6[illegible]0						Other British West Indies
161,866	11,850	115,836	25,142	41,863	1,418	35,001			5	4,805					32	Cuba
16,443	1,376	14,014	1,797	3,394	62	986	5	2,040	1	820					46	Dominican Republic
1,631	156	1,722	279	502	26	579			2	1,237						Dutch West Indies
992	88	1,769	95	264												French West Indies
9,086	135	2,107	264	447			2	819			1	1,179				Haiti
744	24	362														Virgin Islands
453,818	10,940	130,925	3,083	5,261	224	7,772	55	25,081	40	38,679	46	57,417			1,964	Argentina
1,737	12	173	8	19												Bolivia
346,819	404	5,251	116	282	19	551	13	5,311	3	1,697					10	Brazil
37,038	927	15,048	576	1,506	14	416										Chile
29,018	997	14,278	1,313	3,488	26	468			1	968	1	1,359				Colombia
2,358	100	1,206	140	255	2	47										Ecuador
516					10	152	10	3,784	4	3,362			1	326	42	British Guiana
286	32	214	24	29												Dutch Guiana
740					4	417										French Guiana
97																Paraguay
33,415	1,623	27,131	1,510	3,431	48	1,293			3	2,451	1	1,311				Peru
58,086	3,199	41,312	1,084	2,066	17	394			5	2,602					14	Uruguay
10,778	1,814	23,781	2,409	5,468					11	10,100	1	1,311				Venezuela
																Asia
214	60	565	10	18			5	1,430	2	1,485					3,627	Aden
37,827	1,089	17,991	1,117	2,687	105	1,746	176	67,582	3	1,927	38	41,562	39	17,178	26,546	British India
2,937	529	6,904	329	671	33	558	9	4,217	13	9,293			4	1,844		Ceylon
18,546	1,015	13,666	674	1,464	54	958	7	3,339	2	1,530					6,596	Straits Settlements
18,374	83	1,279	175	286	15	193	1	455								China
744																Chosen
17,731	4,749	44,902	5,094	8,331	239	6,016										Java and Madura
3,109	146	1,522	2	10	61	1,955	42	18,059			2	2,030	2	696	11,198	Other Dutch East Indies
487																Far Eastern Republic
	55	1,283	66	297												French Indo China
370																Hejaz, Arabia and Iraq
1,955	20	285	43	62			2	870								Hongkong
45,784	3,622	29,544	2,745	3,506	196	3,336	51	21,043	20	11,677						Japan
49					6	267										Kwantung
7,207	247	3,153	10	26												Palestine and Syria
																Persia
34,564	4,656	55,291	5,936	10,718	318	8,279										Philippine Islands
124	20	174													1,369	Siam
																Oceania
207,441	5,970	77,647	3,069	6,37[illegible]	967	27,883	132	38,439	29	23,540	65	76,224	120	39,693	39,638	Australia
251													1	326		British Oceania
1,344	26	237														French Oceania
85,159	5,635	80,209	4,801	9,618	357	12,640	635	238,671	222	146,844	44	51,907	336	120,783	32,522	New Zealand
455	24	273	46	89	5	150	11	3,500					7	2,236	1,077	Other Oceania
																Africa
																Belgian Congo
12,325	129	3,325	59	146			30	8,597	3	1,641			20	6,520	1,809	British West Africa
83,765	2,032	26,986	1,867	3,366	16	484	41	15,668	12	6,901	5	6,212	3	978	62,821	British South Africa
8,174	180	2,424	390	626			44	15,375	4	2,436			30	10,162	5,913	British East Africa
3,137	261	3,060	168	292	79	2,729										Canary Islands
3,720	116	1,353	542	647			9	4,275	1	7,492						Egypt
					30	820										Algeria and Tunis
1,547																Other French Africa
1,163																Morocco
849							1	33	2	1,027			7	2,287	332	Portuguese East Africa
1,159																Other Portuguese Africa
2,035																Spanish Africa
$4,284,540	109,584	$1,377,210	101,781	$187,865	9,172	$215,143	1,689	$633,290	611	$453,463	275	$328,055	572	$205,204	$240,355	Total

Price is Only One of the Elements Involved in Profitable Buying

Ideal purchasing plan includes buying at the smallest average price, employment of minimum capital with maximum turnover, balanced inventory over seasonal fluctuations, uniformity of product, regularity of delivery and stable source of supply.

By Harry Tipper

PRICE is only one of the elements involved in profitable buying. The capital invested in raw materials, the balancing of inventory, the stability of operations, the flexibility through seasonal and other expected fluctuations, and turnover are sensibly and definitely a part of the measure of the buying policy, as it relates to profits.

Raw and other materials, parts and supplies, form so large a part of the total cost of the automotive product that purchasing methods and policies have a direct effect upon all profits.

The effect of buying upon the cost of a product, being direct and visible, usually receives more consideration than the other effects which are less easily observed. This visible connection between buying and product cost has had the effect of emphasizing price condition almost to the exclusion of the other items.

THIS is the sixth of the series of articles on Profits vs. Volume and the first of a group on the economies that may be effected in purchasing. The seventh article will appear in next week's Automotive Industries.

The raw materials required in the automotive business commonly fluctuate through wide ranges at different periods; semi-fabricated products and supplies manufactured therefrom are equally affected, so that buying tends to be predicated upon the changes in the market, both in the length of contract and the amount bought.

Once in a while business conditions change so rapidly and so violently that the fallacy of buying upon price changes alone is forcibly drawn to attention. Such a condition obtained in 1920 and the difficulties imposed by the reckless buying indulged in before that break suggested that other factions, such as capital, turnover, flexibility, had their definite place in buying operations.

This lesson, however, has not been applied to the changes which are less violent but which can be foreseen with much greater accuracy.

Manufacturing prices must be based upon average prices, or expected prices of raw materials and other bought items; not upon the actual prices which are paid from time to time. The purchasing manager's records can easily show the price advantage secured over the average established, but the disadvantages which may arise from unbalanced inventory, capital cost, seasonal carryovers, instability of supply, and so forth, have no place in the records of the purchases and may never become visible on the books of the company.

The ideal buying plan includes purchase at the smallest average price, the employment of minimum capital with maximum turnover, inventory balanced through the seasonal fluctuations, uniformity of product, regularity of delivery and stable sources of supply. Obviously the market condition of the item to be purchased is not the only factor by which this ideal result will be obtained.

Wide fluctuations in market values of the items to be purchased may justify the extension of the purchase order and the expansion of the inventory, but the object of the factory operation is to keep the material flowing into the factory with constant regularity, synchronized as nearly as possible with the production pace and arranged for delivery in accordance with the monthly expectancy of sales.

The spectacle of capital tied up in future inventory so that price advantage has been lost in other costs is not an unusual one. The costs of delayed deliveries, arising from unstable sources or unbalanced purchase of inventory, has frequently offset all the price difference secured through the adoption of untried sources or improperly considered quantities.

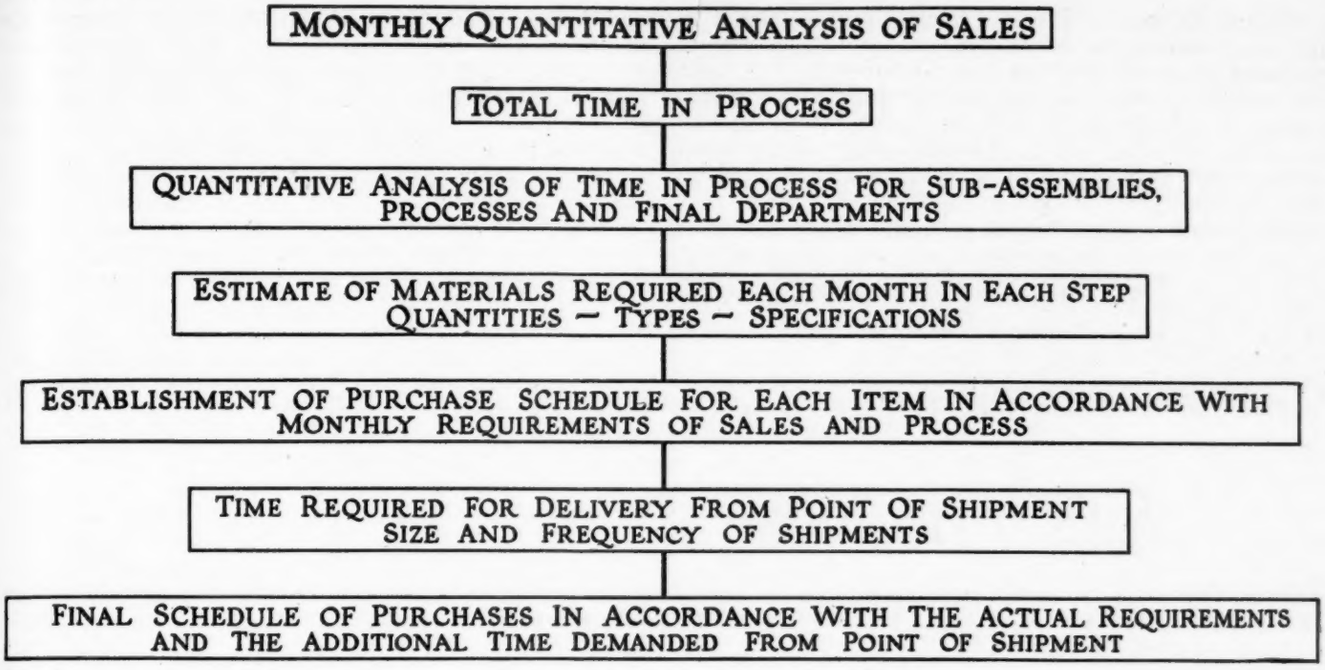
The processes which must be gone through at every factory, more or less indefinitely, in order to develop the best buying objectives, can perhaps be better emphasized by the chart, which indicates the steps required in the determination of the factors. These steps are not intended as a chart of the processes for securing this information. The actual process will arise out of the usual methods of stock-keeping and factory accounting. They serve, however, to put before the purchasing executives the items which should be known in order to effect an efficient buying schedule, so that the tendency to purchase on price fluctuations is limited to the practical necessities of the factory operations.

The factors which enter into the costs of purchase outside of the extent and cost of the purchasing department are as follows:

(1) The average price actually paid for materials during the manufacturing year, compared with the average price estimated for purposes of expected manufacturing cost.

(2) The average amount of capital required for inventory purposes, the number of times the capital is turned over, and the cost of that capital to the company.

(3) The cost of delays, due to irregular deliveries, to rejected materials, or the shifting of supply sources.


MONTHLY QUANTITATIVE ANALYSIS OF SALES
TOTAL TIME IN PROCESS
QUANTITATIVE ANALYSIS OF TIME IN PROCESS FOR SUB-ASSEMBLIES, PROCESSES AND FINAL DEPARTMENTS
ESTIMATE OF MATERIALS REQUIRED EACH MONTH IN EACH STEP QUANTITIES — TYPES — SPECIFICATIONS
ESTABLISHMENT OF PURCHASE SCHEDULE FOR EACH ITEM IN ACCORDANCE WITH MONTHLY REQUIREMENTS OF SALES AND PROCESS
TIME REQUIRED FOR DELIVERY FROM POINT OF SHIPMENT SIZE AND FREQUENCY OF SHIPMENTS
FINAL SCHEDULE OF PURCHASES IN ACCORDANCE WITH THE ACTUAL REQUIREMENTS AND THE ADDITIONAL TIME DEMANDED FROM POINT OF SHIPMENT

(4) The cost of additional inventory carried through low periods, above the requirements—that is, the carrying cost of this inventory.

These factors of buying are required of intelligent purchasing. The costs which enter into the efficiency of a purchase are based upon the previous statement, that the ideal manufacturing condition requires the purchase at the smallest average price consistent with the employment of the minimum capital required to a flow of materials entering the factory in accordance with the production pace.

Factors Which Enter Into a Purchase

The actual factors which enter into the purchase itself are:

(1) Price.
(2) Quality.
(3) Uniformity.
(4) Regularity of delivery.
(5) Stability of supply sources.

In regard to the larger purchases, many of these factors are thoroughly understood as they relate to several sources of supply. In that case the price becomes a larger factor in the purchase itself.

It is difficult to keep a factory balanced in its supply of raw materials, semi-fabricated parts and other items entering into the product or processes. There is always a tendency for the inventory to show a surplus of one material or another. This condition arises partly out of the consideration of actual prices as the main factor in the purchase and the general neglect of the relation between price, capital invested and factory requirements in the development of the purchasing plans.

It is, of course, necessary to buy in advance on a favorable market, where the fluctuations in price are of great importance, and it is equally an advantage to be prepared to carry over a period of high prices without having to buy to so great an extent. This advantage, however, is strictly limited to its effect upon the average price paid throughout the manufacturing period upon which sales price has been based. It is also strictly limited by the carrying charges involved in the extra inventory, the excess space demanded and the relation between this accumulation of inventory and the future expected schedule of operations.

What a manufacturing establishment demands more than anything else is a reasonable stability of average cost through the sales period during which the price of the finished product must remain practically stable, and the establishment of minimum costs in the actual carrying charges for space, stock-keeping and the like, and a maximum turnover of the capital required for operations.

Too many times in the purchase of materials of importance in the factory operations small differences in price have increased or decreased the quantity without much relation to manufacturing requirements. In such cases a careful consideration of the indirect costs arising out of these changes would have indicated the advisability of adhering closely to the production schedule in the purchase of materials, unless the price fluctuations are of sufficient percentage to overcome the indirect disadvantages.

In addition to these indirect costs the factors relating to the product purchased require consideration. Uniformity of product is very important if operations are to be conducted without unnecessary delays and factory costs kept down to a minimum.

Methods and Costs of Inspection

Elaborate methods of inspection demanded in some cases in order to insure the uniformity of the raw material and other items constitute a very definite part of the overhead.

In semi-fabricated and fabricated parts and supplies uniformity of product is frequently of more importance than a small difference in price in the actual product itself.

Assurance that the supplier will provide a product measuring up to specifications permits inspection at the factory to be brought down to a minimum of cost and to serve as a check rather than a continuous examination of each delivery.

Stability of supply sources and regularity of delivery are of equal importance to efficient factory operation. Idle time due to lack of materials, parts or supplies is a very costly interruption. The necessity for developing a new source of supply, due to the inefficiency of the contractor, involves considerable additional expense.

Though all these elements of buying are understood by manufacturers in the automotive field, there is a definite tendency always to overemphasize the importance of direct and visible costs and savings and to minimize the importance of the indirect and invisible expenses involved. As a consequence price, which is obvious and usually recorded in connection with the purchase, receives maximum attention. Other factors are not arranged in such a way that their value can be determined in relation to the purchase.

In other words, the purchaser analyzes very carefully the price market, whether it is going up or down, uses all the information he can secure to decide upon the terms of the buying and safeguards himself in every direction in regard to price only. He knows that he should not carry too much inventory, that there is a definite relation between the flow of material and the factory operations, and that uniformity, delivery and stability of contract are of importance. The actual effects of these matters, however, are difficult to determine and consequently they remain merely additional points to be considered if the price is satisfactory. The fact that they have some bearing upon the price itself is too frequently overlooked.

None of these indirect costs are so illusive that they cannot be determined. They can be analyzed just as thoroughly as the direct labor costs on a machine operation or the conditions involved in the departmental cost of a factory process. They are usually lost because the methods of analysis do not undertake to segregate them. That they should be determined is obvious. The vital object of the purchase is to contribute toward the maximum return on the capital invested over the manufacturing period.

This Seat Has Back Which Moves with Passenger

IMPROVED riding qualities and reductions in manufacturing and maintenance costs are among the advantages claimed for a new type of seat which has been developed and patented by the Unison Seat Co. of America, General Motors Building, Detroit. In this seat, the frame of the seat cushion rests on a group of hourglass springs supported by the seat pan and is hinged to the frame of the back cushion. The latter cushion is mounted in guides so that it is free to follow the up and down motion of the seat cushion frame on its carrying springs. The Chrysler roadster is being equipped with this type of seat under a license from the Unison Co.

Construction shown diagrammatically in the accompanying sketch is for a rear seat in a passenger car. The frame of the seat cushion A rests on the carrying springs C, which are in turn supported by the seat pan D. Cushion A also is joined to the frame of the back cushion by the hinge L. Mounted on the back cushion are guide brackets I, to which are attached fiber tracks K. These tracks fit into channels J, mounted on the sides of the seat strainers H. The cushions are upholstered in the conventional manner.

Free motion of the seat with respect to the body is provided for by allowing sufficient clearance at the edges of the cushions to prevent binding with resultant friction which would restrict the up and down movement. By having the back cushion connected to the seat cushion so that the two move in unison, the polishing action on the passengers' backs which results when the two cushions are installed in the conventional manner, is avoided. Consequently no friction which would act against the free motion of the seat is developed at this point. In addition, wear and disarrangement of the passengers' clothing is avoided.

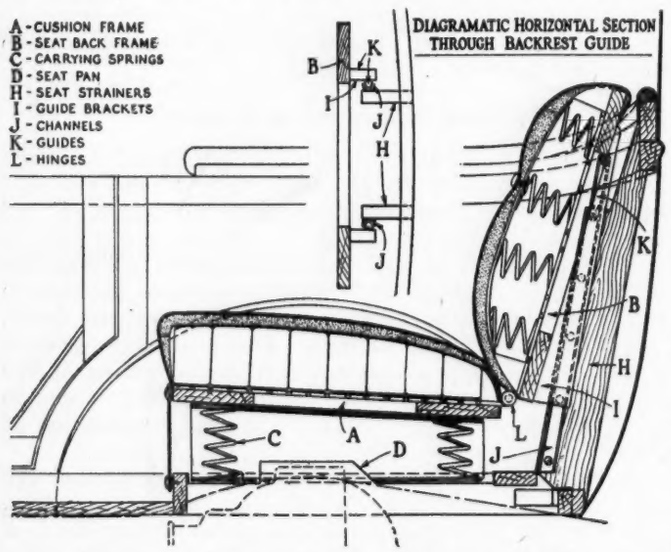


Diagram of Unison seat, the back rest of which moves with the occupant instead of polishing his clothing

When the wheels of the car pass over an irregularity in the road, the resultant shock, which is transmitted through the chassis springs to the frame, is absorbed largely by the seat carrying springs and consequently does not cause discomfort. In fact, the weight of the passengers has much the same effect as a shock absorber in restraining the motion of the chassis frame without, however, the passengers' being conscious of this action.

With this construction seats are readily removable, which is an important feature. In the factory, the seats can be upholstered in the trim shop, covered with cheese cloth and put in stock until the car is ready for final inspection, at which time they are withdrawn and installed. In this way the liability of damage to the seat upholstery while the car is on the production line, is avoided with a consequent saving of salvage expense. It is claimed also that the body does not have to be sent to the trim shop as the top and side linings can be tacked in place while it is on the production line.

In the service station seats can be removed easily for cleaning or recovering. The removable feature is also an important advantage where it is necessary to take dents out of the body panels, or when the car is repainted. It is possible also for the user to carry loads in the car that would damage the upholstery on the seats if they were not removed.

In a demonstration of the Unison seat in a Maxwell sedan over some of the roughest streets in Detroit at speeds ranging from 15 to 25 m.p.h., the shocks produced by bumps and depressions in the road, were practically absorbed and, at no time, was there any tendency for the passengers to be thrown off the seats by the reaction of the chassis springs on the frame. This latter fact permits reduced headroom with resultant savings in body cost and improvement in appearance. In riding over rough pavements the sensation was much the same as would be experienced in a car with conventional seats when passing over a fairly good cobblestone pavement.

EDITORIAL

Dramatizing Details

THE small attendance at the S. A. E. production meeting last week already is calling forth some speculation among general executives as well as among engineers directly interested in the society. If failure to attract more production men to the sessions was a fault of the program or the promotion of the meeting, it is of major importance only to those directly involved in promoting the welfare of the Society and probably will be remedied next year without difficulty.

If, on the other hand, the small attendance is a visible sign of the shifting emphasis from manufacturing to sales problems, it is of some significance to everyone in the industry.

Can it be that production difficulties in automotive work have been overcome to such an extent that the men engaged in the practical work of turning out vehicles and parts no longer find it necessary to spend time exchanging ideas? Hardly. An expert walking through the average plant even today can find too many things that ought to be improved. Yet it is true that usually these troubles are detailed rather than major in character.

Production has lost the dramatic values that it once held. The pioneer in constructive merchandising has stolen the center of the automotive stage and will continue to hold it for some years to come. The detailed questions with which production men must concern themselves from now on are just as important but not nearly so interesting as the broader problems involved in earlier discussions. Because of the importance of these details some method should be found to dramatize them, to envelop them with a cloak of interest and serve them up in such a way as to attract the attention they deserve.

Bus Development

IF anyone is disposed to doubt that buses are undergoing rapid development, he should compare one of the latest six-wheel or "axleless" types shown recently at Atlantic City with one of the truck chassis slightly modified and fitted with a body for passenger carrying which were sold extensively as buses only three or four years ago.

Most of the changes which have taken place during this period are those calculated to improve riding qualities and increase the seating capacity of the vehicle. These are commendable improvements but even the designers of the latest buses readily admit that there is still much room for improvement, even along lines in which it has been most rapid to date.

Lighter bodies and greater durability are among the important items which demand greater consideration in the near future.

At the present time it is customary to use a heavy frame made as stiff as possible and to mount upon it a relatively heavy body which is not designed to withstand heavy twisting strains. The result is a very heavy vehicle,—one which weighs from two to three times the maximum load it is supposed to carry, and must have a large and powerful engine to propel it.

In contrast to this, one prominent concern is said to have built an experimental bus capable of carrying thirty passengers, but so light that one man can lift one rear corner. In this case aircraft practice involving extensive use of thin-wall, alloy-steel tubing welded together is said to have been employed, while a medium size passenger car engine furnished the power necessary for propulsion.

This is just an example of what can be done if one sets about designing for light weight. Duralumin and plywood can be used to advantage in certain forms of structure which appear feasible. They should be given due consideration. Aircraft practice well might be followed in some cases and there seems to be no reason why body and chassis frame should be separate units. In any case such a structure merits consideration.

Ways and means for increasing durability also demand consideration. What generally are considered well built buses today have an average life of around five years. A trolley car lasts from ten to twenty years. Why should not a motor bus do the same? Here is food for thought.

Foundry Progress

IT has long been a commonplace that engineers, before designing a machine part that is to be cast, should consult the foundryman as to the best method of casting it, and make the design accordingly. The wisdom of consulting with the practical man in the foundry can hardly be doubted, but his statements as to what can and what cannot be done must sometimes be taken with a grain of salt. If some of the six-cylinder block castings that have been turned out in recent years had been demanded of a foundry twenty years ago, the job would certainly have been declared an impossibility. Today these castings are turned out with only a moderate number of rejects.

The same as other auxiliary industries, that of the foundryman has been greatly stimulated by the work provided and the demands made by the automotive industry. With its improved methods of machine molding, mechanical handling of foundry sand and of the molten metal, and its improved ventilation and lighting, the modern foundry bears little resemblance to that of a score of years ago, and the foundries directly connected with automotive plants and those specializing on automotive castings have been leaders in this progress movement.

Our Industry Today—

Weather Conditions Have Been Important Factor in Keeping Up the Retail Sales Curve of Automobiles

NEW YORK, Oct. 27—Good weather has been an important factor in keeping up the automobile retail sales curve. Automobile business as a whole has been better maintained than is usual at this season of the year. A slowing up both in sales and production may be expected to follow the coming of colder weather, and this slackening, it is felt, will extend into the remaining months of the quarter.

The high production marks of a year ago are not expected to be approached in either November or December, an expectation that is based on the present tendency of manufacturers not to crowd dealers with cars and to make no great effort toward accumulating stocks this year for next spring's demand. This tendency is shown by many of the major producers.

Profit from Early Lesson

The industry will profit from the lesson learned in the spring of this year when manufacturing operations were forced to be curtailed because of heavy stocks in the hands of dealers and in producers' warehouses and the impossibility of moving them at the time anticipated.

Many of the producers in October have brought their schedules to a lower level than prevailed in September. Ford's output totals probably will be brought lower although operations are still being maintained at a relatively high point.

Used cars are selling well, due in part to the buying activities of the farmer. New car sales are making no appreciable advance in farming sections and it is believed that such sales as are made to farmers between now and the first of the year will make no great difference in the production curve. The farmer, however, is proving a consistent buyer of used vehicles, this fact pointing to his importance as a new car buyer later on in the buying season.

Farmers Buy Used Cars

Farmer buying of used cars took a strong move upward with the harvesting of the crops, his appearance in the market up to that time not being great enough to have him considered as a strong factor in the disposal of automotive products. It is apparent that while he feels the need of automobiles to replace those that have become worn out through constant use he is not yet disposed to invest more of his profits in motor transportation than is absolutely necessary to supply his needs.

This year will probably see him placed firmly on his feet, his debts liquidated and himself in a position where he can become a readier purchaser of new vehicles.

Deny That Ethyl Gas Use Menaces Health

Officials Say Exhaustive Tests of Fuel Have Proved It Is Not Dangerous

NEW YORK, Oct. 29—Considerable stir has been created by publicity given to the circumstances surrounding the death here of three men and the illness of several others engaged in the manufacture of tetra-ethyl lead at the plant of the Standard Oil Co. of New Jersey at Bayway, N. J., and the consequent investigation by public health officials.

It is believed that the deaths and illness were due to lead poisoning such as is known to occur in the case of workmen exposed to lead compounds used in paint and other commodities.

This unfortunate occurrence was made the occasion for statements by Prof. Yandell Henderson of Yale University to the general effect that the use of gasoline containing tetra-ethyl lead is a serious menace to public health. That this is the case is denied vigorously by officials of the Ethyl Gasoline Corp., who state that exhaustive tests made to determine whether or not the use of Ethyl Gas is a menace to health have shown definitely that it is not.

Thomas Midgley, Jr., vice-president of the Ethyl Gasoline Corp. and largely responsible for the development of Ethyl Gas, interviewed here today, said that not a single case of illness attributable to lead products in the exhaust of engines using Ethyl Gas has been reported, although more than 100,000,000 gal. of gasoline treated with tetra-ethyl lead has been sold this year.

It is not denied that serious hazards are involved in the manufacture of tetra-ethyl lead, but these are said to be far less severe than those encountered in many other industries. Nevertheless, great precautions are taken to minimize these hazards and to insure the health of those engaged in the manufacture of tetra-ethyl lead. In spite of these, employees sometimes become careless or fail to heed the necessary precautions with unfortunate results.

Repeated contact with concentrated tetra-ethyl lead may produce poisoning, but the concentrated product never is sold to the public. When not mixed with the fuel at the refinery it is supplied only to fuel stations in sealed cans to be opened only after the can is placed inside the "ethylizing" device, so that only through carelessness or failure to follow instructions can difficulty result.

In one test conducted by General Motors all the vehicles in a certain garage accommodating some 30 cars were required to use Ethyl Gas for a month. During this period one car in the garage was kept idling several hours a day. The garage was cleaned thoroughly at the beginning and end of the month, but not between times. All sweepings at the end of the period were analyzed for lead content and, it is stated, the total quantity of lead found amounted to only 3 per cent of the total used in the fuel consumed by the one car whose engine was allowed to idle in the manner indicated.

Other analyses of sweepings obtained from streets in various towns, in some of which Ethyl Gas is used extensively and in others of which this product is not sold at all, are reported to have shown that lead is present in similar proportions in practically all cases. It is pointed out that lead compounds are used extensively in the manufacture of tires and that the use of Ethyl Gas has shown no appreciable increase in the presence of lead in road dust.

Ethyl Gas is being marketed in the territories covered by the Standard Oil Companies of New Jersey, Indiana and Louisiana and by the Gulf Refining Co. in New Jersey, Pennsylvania, Delaware and Texas. Other companies handle it in West Virginia and Ohio. No change in marketing plans is contemplated.

Rainier Trucks Formed to Succeed Old Company

NEW YORK, Oct. 30—Rainier Trucks, Inc., will succeed the Rainier Motor Corp. under a reorganization plan worked out by the creditors' committee, taking over the property of the truck concern, except inventories and accounts receivable.

A new mortgage for $135,000 covering the plant and equipment only has been given by the new company to the Chatham and Phenix National Bank. It is stated that the notes of the old company held by merchants and creditors will be renewed as they fall due.

Old officers and directors have resigned and the following directors have been recommended for election by the creditors' committee: A. E. Parsons, Lemore Carbaugh, G. A. Dana, Eleanore P. Keating, Charles H. Wheelock, W. D. Zahrt and Francis P. Conheeny.

G. M. Exchange Offer Expires December 31

It Will Not Be Renewed After That Date, Stockholders Are Informed

NEW YORK, Oct. 30—The offer of the General Motors Corp. to exchange the old securities for the new 7 per cent preferred stock expires Dec. 31, 1924, and will not be renewed, the corporation states in a letter to stockholders mailed today with the November dividend checks. This is the third and final notice.

In the letter it is pointed out that the new 7 per cent preferred is preferred as to assets and dividends and has preference over all other stocks of the corporation with no mortgages ahead of it.

As explained by the corporation, stockholders making the exchange benefit by a material increase in the actual dollars received in dividends and a larger yield upon the money invested, especially if new money to the extent of $10 a share is invested. For example, it says, a stockholder who owns ten shares of old 6 per cent stock sells one share and with the cash proceeds and nine old shares exchanges for nine shares of new 7 per cent preferred.

The annual return on 10 shares of old 6 per cent stock was $60, compared with $63 on the nine shares of new 7 per cent preferred. If ten shares of old 6 per cent stock, plus $100 cash, is exchanged for 10 shares of new stock, then there is an increase of 1 per cent per annum in dividends, or the equivalent of 10 per cent per annum on the new money invested.

So long as the right to exchange obtains, it is to be expected that there will continue a price differential of approximately $10 a share between the old 6 per cent issues and the new 7 per cent preferred. However, after Dec. 31, 1924, when the right to exchange expires, it is only reasonable to presume that with this right removed there will be established a wider price differential between the old issues and the new 7 per cent preferred stock, based purely upon the yield basis which will be to the price detriment of the old issues, the corporation states.

Moon Earned $3.57 Share in Nine Months This Year

ST. LOUIS, Oct. 28—Moon Motor Car Co.'s report for the third quarter shows net income of $241,037 or $1.34 a share compared with net income of $198,872 for the second quarter. For the nine months net income totaled $642,277 before taxes, equal to $3.57 a share on the 180,000 no par value common shares outstanding, compared with net income of $932,107 for the same period last year.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Oct. 28—Irregularity and hesitancy are still the principal features of the business situation. Undoubtedly the approaching election is a strong deterrent factor. General commodity prices were slightly lower last week, farm products particularly showing a considerable drop from the high figures of the preceding week.

The official report on the cotton crop, based on condition Oct. 18, forecasts a yield of 12,675,000 bales, or 176,000 bales more than the previous estimate. The condition of the crop is placed at 54.7 per cent of normal, as compared with 53.5 per cent on Oct. 1 and 47.8 per cent on Oct. 25, 1923. Cotton ginned prior to Oct. 18 amounted to 7,600,826 running bales, comparing with 6,409,381 bales in the corresponding period a year ago and 6,978,321 bales two years ago.

Cotton spinning activity, as measured by active spindle hours, was higher in September than in July or August. The September total was 6,414,902,010 hours, as against 5,399,549,661 in August and 7,482,060,995 in September last year.

Factory employment increased 2 per cent during September, according to an announcement by the Federal Reserve Board. Increased activity in trade and industry was also reflected in slightly higher per capita earnings of industrial workers and a considerable increase in borrowing for commercial purposes. The production of basic commodities and the distribution of merchandise were also more active.

Car loadings in the week ended Oct. 11 numbered 1,088,462, comparing with 1,077,006 in the preceding week and 1,085,938 in the corresponding period last year. The current figure is the largest of the year to date.

Debits to individual accounts by banks in leading cities during the week ended Oct. 22, as reported to the Federal Reserve Board, amounted to $10,768,000,000.

TRUCK EXPORTS' SURVEY

WASHINGTON, Oct. 29—A survey of the export possibilities of car and truck manufacturers will be begun on Nov. 10 by August Zimmerman, chief of the Car and Truck Section of the Automotive Division, Department of Commerce.

$3.90 Share Earned by Yellow Cab Maker

Net Profits for Nine Months Reported at $2,675,566, a Drop from 1923

CHICAGO, Oct. 27—The statement of the Yellow Cab Manufacturing Co. reveals a reduction in earnings for the nine months of this year as compared with the corresponding period of 1923. Reduced earnings are attributed to the general falling off of business in the industry and the fact that during the year approximately $1,000,000 has been expended out of earnings for experimental work by the Yellow Coach Co., a bus manufacturing subsidiary.

Net profits for the Yellow Cab Manufacturing Co. after expenses and charges for depreciation were $2,675,566, against $3,524,372 reported for the first nine months of 1923. After provision for federal taxes the net available for dividend purposes was $2,341,121, equivalent to $3.90 a share on the outstanding 600,000 shares of capital stock. Dividend requirements for the three quarters of $3.75 a share were therefore comfortably earned. This compares with a net of $3,083,825 or $5.01 a share for the corresponding period of 1923.

Property of National at Dayton to Be Sold

CINCINNATI, Oct. 30—United States District Judge Smith Hickenlooper has entered a decree of foreclosure and sale in the foreclosure suit of the Union Trust Co. of Chicago, as trustee under the mortgage securing an issue of $3,000,000 Series A bonds vs. the National Motors Corp. of Dayton, Ohio.

Under the decree the property of the defendant company at Dayton is to be sold on the premises to the highest bidder at noon Friday, Dec. 12, by Harold J. Linkert of Dayton, who is appointed special master to conduct the sale.

From the proceeds of the sale priority is awarded to lien holders whose claims total approximately $40,000, and to holders of receiver's certificates. Costs and expenses of the sale are to be paid before the claims are given priority. The remainder of the proceeds is to be applied upon the $3,000,000 outstanding Series A bonds.

LOUIS K. RITTENHOUSE DEAD

NEW YORK, Oct. 28—Louis K. Rittenhouse, president of the Rittenhouse Rubber Co. of Newark, N. J., was held up Monday night by footpads near his home. When he resisted he was shot and died of his injuries soon after. Mr. Rittenhouse was well known in the tire industry, at one time having been district manager at Detroit and Boston for the Diamond Tire Co.

Broker Asks to List Stock; Maker Objects

Briggs Manufacturing Co. Opposed to Open Trading on Detroit Exchange

LANSING, Oct. 25—Under a petition filed with the Michigan Securities Commission, the Briggs Manufacturing Co., body builders, would be compelled to permit the sale of its stock upon the Detroit Stock Exchange. The company is opposed to the listing of its stock, disapproved of this action at its directors' meeting on Oct. 15, and asks the commission for an order permanently restraining the open trading of any of the securities of the company.

The petition for listing the stock is presented by a brokerage company which owns 1500 shares of the outstanding 750,000 shares of no-par common stock. Under the terms of the petition the whole stock issue is sought validated for trading within the State. Assets of the Briggs company are in excess of $25,000,000.

The Briggs company recently bought the Michigan Stamping Co., paying one share of Briggs stock for each share of the Stamping company stock. Until that time none of the Briggs stock was on the market. The preferred stock had all been redeemed for cash, and the common stock had never been validated by the State. The Michigan Stamping Co. stock, however, had previously been listed and traded.

The case is considered of importance to all Michigan corporations, as it is the first time that the Securities commission has been asked to rule upon a question of this kind. Adjournment was taken for ten days to permit attorneys to present their views upon the right of the petitioner to seek the validation. It is expected that the commission will deny the request, and that the case will be carried to the State Supreme Court.

Preferred Stockholders of Weidely Sue Officers

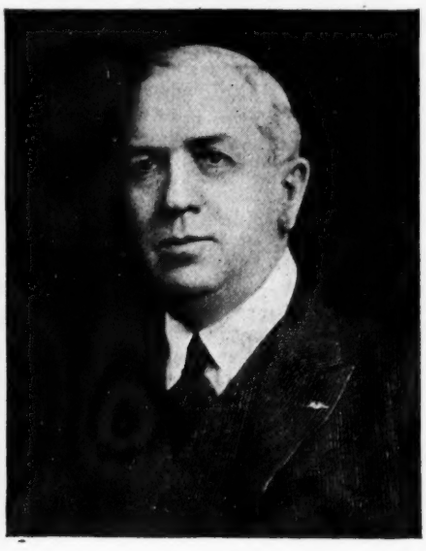
INDIANAPOLIS, Oct. 25—Frank Daly and 75 other preferred stockholders of the Weidely Motors Co. filed suit here this week, asking damages of $150,000 from Edward P. Showers and William Unphrey and William H. Fletcher, former officers of the company.

The complaint states that Mr. Fletcher was appointed receiver for the company about a year ago and later sold the plant to himself and the two other defendants at less than its true appraisal. It is further alleged that in the course of the company's difficulties, and before receivership but during refinancing, stockholders were persuaded to extend the date of redemption of their shares for five years, beginning Jan. 1, 1925, and consented to an issue of $700,000 in bonds.

"Secretly and without any knowledge of any of them," the suit says, the defendants later effected the appointment of a receiver, and the plant was sold to the defendants for $130,000, for which cancelled Class A bonds issued under the refinancing agreement were turned in. It is claimed that the sale "was not in good faith" and that the refinancing plan, if it had been carried out would have saved the company.

A. B. Swetland Enters New Publishing Field

NEW YORK, Oct. 28—A. B. Swetland, for 21 years vice-president and general manager of The Class Journal Co., publisher of AUTOMOTIVE INDUSTRIES, *Motor Age*, *Motor World* and other automotive business papers, has withdrawn from that organization, having purchased the *Furniture Index* of Jamestown, N. Y. Associated with him will be Maurice Kane, Adrian Brace and V. M. McConnell.



A. B. Swetland

Mr. Swetland is one of the pioneers of automotive publishing, having acted as manager for most of the publications of his brother, the late H. M. Swetland, formerly president of the United Publishers Corp. and the Class Journal Co.

Coming to New York City in 1890 as treasurer of the Power Publishing Co., now *Power*, A. B. Swetland became associated with *The Automobile* and the Automobile Trade Directory in 1903 as general manager; published *Motor World* in 1911, went to the Class Journal Co. in 1912 when *Motor World* was purchased by the United Publishers Corp., and continued as general manager of the Class Journal Co. until entering the furniture business paper field.

SEEK BUS FRANCHISE

GLOUCESTER, MASS., Oct. 28—City officials have been asked to vote a 10-year franchise for the operation of motor buses in and about the city to take the place of street cars. The matter has been taken under advisement.

Haynes' Plan Faced Strong Opposition

Bankruptcy Followed When Creditors Refused 15 Cents on the Dollar Offer

KOKOMO, IND., Oct. 27—The withdrawal of all opposition to the bankruptcy suit against the Haynes Automobile Co., and the adjudication of the company in bankruptcy by Judge Albert B. Anderson in United States district court at Indianapolis, were the surprising developments in the tangled affairs of the company last week.

The decision to drop opposition to the petitioning creditors was made when it was found that these creditors were preparing to fight vigorously any attempt to carry out the offer of composition by which the debts of the company were to have been paid on the basis of 15 cents on the dollar.

This offer had been accepted by a large majority of the creditors, both in number and amount, but the opposition offered by the petitioners would have tied up the affairs of the company in another and longer period of litigation, it was believed by representatives of the concern, and it was decided that the better course was to allow the firm to be declared bankrupt.

Settlement Money Not Available

One reason for Judge Anderson's action is believed to have been the fact that all the money was not available for the immediate payment of the 15-cents-on-the-dollar offer, although arrangements had been made for the payment of 5 per cent on the acceptance of the offer, 5 per cent 60 days later and the remaining 5 per cent 120 days later. It has been the policy of the Federal Court to require, in cases of composition of creditors, full payment of the amount proposed in cash.

According to schedules filed, assets of the company amount to $1,684,323, with liabilities totaling $3,619,258. The original petition was filed Sept. 2 by the Chicago Tool & Kit Co., the Grinding Wheel Clearing House of Detroit, and H. Merrified of Chicago.

Any statement regarding the future of the company is necessarily speculative. The next step in the court proceedings will be to refer the matter to Harry C. Sheridan, referee in bankruptcy. According to the usual course, he will call a meeting of the creditors for the purpose of appointing a trustee. It is not known whether this trustee will sell the property or set it off to the holders of the $1,500,000 first mortgage bonds. The mortgage securities cover all assets of the company, exclusive of inventory.

The offer of composition which is now nullified was made by the McCord-Rothschild interests, which now control the Apperson Brothers Automobile Co. of this city.

Production of Tires Tends to Slow Down

Said to Be Merely Temporary and Is Regarded as a Pre-election Condition

AKRON, Oct. 29—The production, which has been steadily mounting in the Akron district since last August, has shown a tendency to slow down during the past week. A considerable number of workmen, possibly about 1000, has been laid off, and few new men are being employed.

Factory officials are of the opinion that this is only a temporary lull preceding the election. As spring dating business comes in next month, it is expected that full production schedules will be resumed.

Goodrich Earnings

A financial statement issued by the board of directors this week shows that earnings of the B. F. Goodrich Co. for the quarter ended Sept. 30 amounted to $2,750,000, or $3.50 on each share of common stock. If the present trend continues, earnings for the full year will be about $8,000,000, or $9 or $10 on each share of common.

All bank loans are to be liquidated by the end of the year, it is expected. Goodrich officials predict that common dividends may be resumed by the company next year.

In a letter to stockholders, F. A. Seiberling, president of the Seiberling Rubber Co., states that all the company's back dividends on preferred stock are expected to be paid up by 1925. The board of directors has authorized the payment of back dividends up to July 1, 1922. This leaves an accrual of 18 per cent up to Oct. 1. Mr. Seiberling states that the company has earned a substantial net profit each month this year, and expects to continue to do so.

Although no official announcement has been made, stockholders of the Goodyear Tire & Rubber Co. are hopeful of back dividends being paid on Goodyear preferred stock within the near future. Statements issued so far this year show the company has earned the preferred dividend, with a considerable margin for the common.

Goodyear Buys Marathon

Trade marks and good will of the Marathon Tire & Rubber Co. of Cuyahoga Falls, near here, have been purchased by the Goodyear Tire & Rubber Co. for a consideration of $25,000. The Federal Court of this district approved the sale.

Bank holds a large amount of the company's paper threw Marathon into receivership last January. Liabilities at that time were reported to be about $400,000. Operation for several months under a receiver proved profitable.

The Northern Ohio Traction & Light Co. has received two large double-deck buses, of the improved type introduced by the Fifth Avenue Coach Co. of New York City. The buses are being tested on Akron streets for the Yellow Coach Co. They have a capacity of 36 passengers and cost $12,000 each.

Ohio Body & Blower Co. Planning Refinancing

CLEVELAND, Oct. 28—The Ohio Body & Blower Co., manufacturer of automobile bodies, is to be refinanced, papers having been filed in Columbus for that purpose. The new concern will have a capital of 112,000 shares of no par common stock. It succeeds the company with a capital of 110,000 shares of no par common, of which 102,539 were outstanding.

Under the plans which have been agreed upon, the present indebtedness of the company will be funded through long term bonds, and some additional working capital will be provided through the sales of stocks.

The Ohio Body & Blower Co. is manufacturing bodies for Jordan, Stearns, Moon, Gardner, as well as some for Cleveland and Chandler. The plant is operating at the present time at from 35 per cent to 40 per cent of capacity.

Senator Will Urge Ford to Renew Shoals Offer

WASHINGTON, Oct. 29—An effort is to be made by Congress to have Henry Ford renew his offer for Muscle Shoals, either under the same terms or under modified conditions which will attract the Detroit manufacturer to take over the Government's white elephant.

This is the declaration of Senator Thomas Heflin of Alabama, a member of the Senate agricultural committee, who said that he would attempt to get Ford to renew the offer. He declares that he believes the automobile magnate will renew his bid, and that it would pass the Senate when it came to a vote.

A. T. JACKSON ILL IN PARIS

ROCKFORD, ILL., Oct. 27—A. T. Jackson, vice-president and general sales manager for the Emerson-Brantingham Co. of this city, underwent an operation for appendicitis a week ago in a Paris hospital, according to a cablegram received here. Mr. Jackson was on his way home to attend his wife's funeral when he was stricken. Mrs. Jackson died Oct. 13 from a stroke of apoplexy.

CHEVROLET SERVICE SCHOOLS

DETROIT, Oct. 25—Chevrolet Motor Co. is now operating service schools in each of its seven manufacturing zones. These are Flint, Buffalo, Tarrytown, Janesville, St. Louis, Cincinnati and Oakland.

3 Divisions to Join in Service Meeting

Sales, Service and Engineering Will Be Represented at Cleveland Sessions

NEW YORK, Oct. 27—All three divisions of the automotive industry, sales, service and engineering, will be represented at the Service Convention, to be held in Cleveland Nov. 18 and 19. While some previous service meetings have been specially laid out to include other interests, this will be the first meeting of its kind where both sales and engineering departments have been invited to participate in the conclave of the service men.

The Society of Automotive Engineers and the National Automobile Chamber of Commerce jointly will sponsor the convention, at which about 200 delegates are expected.

Alvan Macauley, president of the Packard Motor Car Co., is the chairman of the Service Committee of the N. A. C. C. and will preside at the sessions. The program will include these subjects:

Treated fuels—Thomas Midgley, Jr., General Motors Research Laboratory.
Balloon tires—James E. Hale, Firestone Tire & Rubber Co.
Nitro cellulose paints—L. V. Pulsifer, Valentine & Co.
Four-wheel brakes—E. V. Rickenbacker, Rickenbacker Motor Co.
Air cleaners—F. A. Whitten, General Motors Truck Co.
Organization and conduct of a modern service station—H. M. Davock, Packard Motor Car Co.
Possibility of greater standardization in electrical equipment—A. M. Dudley, Westinghouse Electric & Manufacturing Co.
Training of mechanics—John Younger, editor of *Automotive Abstracts.*
Need of more engineering in service—George H. Duck, business manager of *Commercial Car Journal.*
Utilizing field experience to improve service—S. V. Norton, service manager, General Motors Truck Co.

In addition to the regular program of papers, it has been decided to have a number of topics for discussion from the floor. This feature has always been used to advantage in the service meetings, but at the last convention in Detroit the attendance was so large that it was found necessary to eliminate it.

It is probable that a number of interesting visits will be planned by the local committee.

Gardner Denies Report Merger Is Contemplated

ST. LOUIS, Oct. 27—A statement issued by President Russell E. Gardner, Jr., declares that the Gardner Motor Co. has made no sort of merger proposal "to the Moon or any other motor company," as had been reported.

Mr. Gardner declares that his company "plans to continue to manufacture and sell its own products, with the four-cylinder model remaining unchanged."

The company, he says, has cash on hand of more than $500,000, with total current liabilities of less than $50,000.

Hudson Lists Coach Below Other Models

Price Differential Also Lowered on Essex, Open Car Being Only $45 Higher

DETROIT, Oct. 27—Price reductions on the Hudson and Essex coaches as now effective make the coach at $1,395 the lowest priced model in the entire Hudson line, and reduces the price differential on the Essex coach, now priced at $945, to only $45 in excess of the phaeton model. The price changes affect only the coach models, the reduction on the Hudson being $105 and on the Essex $55.

As reason for the reduction, Hudson Motor Car Co., though not making a public statement, is understood to have closed contracts for all material and supplies over the next five months at prices so favorable that the new prices are made possible.

There are no price changes in other models, because the entire production in both lines is practically concentrated in the coach models. As the company itself states, "the coaches are our line." The demand for the coaches has become so large, the company declares, that the other models of the line have really no important place in its production or merchandising plans. They merely represent the dealer complementary models, to meet the occasional demand for an open car or higher priced closed car.

Its ability to reduce its Hudson coach price below the price on open models in the same line is declared by the company to be due principally to the extreme production on the coach, and also partially to the fact that the open models represent practically custom work.

Firestone Explains Cut Made in Prices of Tires

AKRON, OHIO, Oct. 27—In a letter to the dealer the Firestone Tire & Rubber Co. explains the recent price reduction. In part it says:

Stability should be the keynote for the tire industry in 1925. It is the purpose of the Firestone organization to do everything in its power to encourage and establish a more stable condition in the tire industry, and we call to your attention that in the past ninety days there have been two agencies that have developed an abnormal condition in the industry.

The British Rubber Restriction Act reduced the production of crude rubber Aug. 1 from 60 per cent to 55 per cent of normal, and if the Restriction Act is carried out according to its provisions, a further reduction of 5 per cent will occur Nov. 1, leaving only 50 per cent production of crude rubber in British territory. The production of tires in the past ninety days has been greatly in excess of normal average consumption. These two conditions have caused an increase in the price of rubber from 18 cents to 33 cents per pound.

Crude rubber production in the territory not under British control has increased nearly double, and we believe will continue to increase very rapidly. Tire production cannot continue long above consumption and a curtailment movement already is under way, and we believe these factors will soon adjust the abnormal conditions that have existed in the past ninety days.

FORD'S OCEAN SHIP TO LOAD AT DETROIT

WASHINGTON, Oct. 28—What is declared by the United States Bureau of Navigation to be the first steamship laden on the Detroit River to go to a foreign port will be the Onandaga, one of the Ford Motor Co.'s freighters which will carry a cargo consisting of automobiles, trucks and tractors from the Ford plant to Buenos Aires.

Change in the route of the vessel, which has heretofore plied on the Great Lakes, was filed with the Bureau this week. The Onondaga and another of the Ford company's ships, the Oneida, are to be used in coastwise trade, plying between New Jersey, Norfolk and South American ports.

Moon Reduces Prices on Full Line of Cars

ST. LOUIS, Oct. 30—Price reductions ranging from $100 to $430 and affecting all models of Moon cars were announced today by the Moon Motor Car Co. All 1925 models are fitted with 4-wheel hydraulic brakes, full size balloon tires, improved disk wheels, new easy steering gear and new colors in Duco finish. The new prices, which are shown below, are effective immediately:

	Old Price	New Price
Series "A" Special		
4-pass. roadster	$1,450	$1,295
5-pass. sport phaeton	1,395	1,195
5-pass. phaeton (encl.)	New	1,270
5-pass. sedan 2 door	1,695	1,495
5-pass. sedan 4 door	1,795	1,695
5-pass. petite sedan	New	1,785
Newport (6-40)		
5-pass. phaeton	$1,595	$1,495
4-pass. coupe	2,035	Disc.
5-pass. sedan	2,045	1,815
5-pass. petite sedan	2,345	1,915
Metropolitan (6-50)		
5-pass. phaeton	$1,695	$1,515
5-pass. sedan	2,135	1,995
5-pass. petite sedan	2,245	2,095
London (6-58)		
5-pass. sport phaeton	$2,095	$1,985
5-pass. petite sedan	2,885	2,540

Nash Sales Since 1916 Valued at $324,170,094

KENOSHA, WIS., Nov. 1—Since taking over the old Jeffery company in August, 1916, the Nash Motors Co. has sold $324,170,094 worth of its products. Last year the sales ran more than $58,590,000. Nash sales for the month of October are expected to exceed $7,000,000, making it the best month in the history of the corporation. During its eight years of existence the company has paid out in wages and salaries $48,318,459.

Acme in Production on New 1-Ton Truck

Model "Acme Flyer" Is Featured by High Speed, Long Wear and Low Cost

CADILLAC, MICH., Oct. 28—High speed, long wear and low cost are featured as the high points of the Acme Flyer, a new model just put into production by the Acme Motor Truck Co. The job has a load capacity of 1-ton and in addition to the mechanical features, some attention has been given to appearance.

A stream line effect has been secured in the hood and cowl to harmonize with the bodies and a closed cab has wide and convenient doors. A standard open express body is provided and this can be fitted with a canopy top.

The power plant is a Continental S4 with bore of 4¼ in. and stroke of 4½ in., giving a formula rating of 28.9 hp. The power plant with the other units is designed to permit speeds of 35 m.p.h. The wheelbase is 130 in. and the turning radius 20 ft. The frame from the back of the driver's seat measures 97 in., the overall length being 189 in. The frame is of pressed steel and is semi-flexible.

The front axle is a drop forging with taper roller bearings in the wheels and ball bearings in the spindles. The rear axle drive is by bevel gear with a ratio of 5.1 to 1. The axle is of the full floating type, roller bearing equipped throughout and with two bearings in each wheel hub. The gearset is a Brown-Lipe mounted in unit with the engine and clutch. The driveshaft is a tubular, one-piece unit.

The wheels are of steel, spoked type and are fitted with 30 x 5 pneumatic cord tires all around. Alemite chassis lubrication is used and an electric starting and lighting system is part of the regular equipment.

Yellow Cab Turns Out New Open Express Body

CHICAGO, Oct. 28—The Yellow Cab Manufacturing Co. is now turning out an open express body for its T-1 Yellow Cab express chassis. The chassis has been in production about a year. The new body can be had with open cab, closed cab or half door cab.

Attachments and equipment can also be obtained to convert the body into canopy top, screen side, grain side or stock rack body. In addition to this line a Chicago stake body, standard stake body and panel delivery body in 8 to 10 ft. lengths may be had for the same chassis. The price of the T-1 chassis is $1,450.

A canopy express with screen attachments has also been added to the ¾-ton Yellow Cab delivery chassis, this to sell for $1,465.

Men of the Industry and What They Are Doing

Thomas H. White II Heads Company

Thomas H. White II, son of Windsor T. White, chairman of the board of the White Motor Co., has been appointed general manager of the White company. He represents the third generation of the Whites and has been connected with the company since 1916. Serving through the war in the Air Service, he became vice-president of the company in 1921, having charge of production, in which position he served until his recent appointment as general manager.

Kelley Secretary of Splitdorf

E. A. Kelley has been elected secretary and treasurer of the Splitdorf Electrical Co. Mr. Kelley has been with the company for years in various capacities, recently having had charge of the branch house and distributive organizations and also being director of advertising.

McLaughlin Returns Home

R. S. McLaughlin, president of General Motors of Canada, has returned from Europe. He declares that the removal of the tax in Great Britain will help the medium priced American cars and adds that the outlook for the American industry abroad is good, with more buying next year than this.

Coapman Visits London and Paris

Among the passengers that sailed last week for Bremen on the S.S. America was C. Walter Coapman, treasurer of North East Service, Inc., of Rochester, N. Y. Mr. Coapman will visit the branches of his organization in London and Paris, supervising work there and auditing books. He expects to be gone two months.

Kapp with John O. Munn Co.

Frank A. Kapp has been appointed vice-president of the John O. Munn Co. of Toledo, which conducts a marketing service for automobile dealers. Mr. Kapp formerly was on the advertising staff of the Willys-Overland Co., then advertising manager of Mitchell Motors, Inc., after which he became vice-president and general manager of the Associated Blue Books Publications, Inc., publishing *Motor Life*, the Automobile Trade Directory and the Automobile Blue Books. Later he became secretary of the Charles H. Fuller Co. of Chicago.

W. M. Chamberlin Joins Oakland

W. M. Chamberlin has joined the Oakland Motor Car Co. to take charge of sales development work in respect to merchandising problems. Mr. Chamberlin organized the Chamberlin Co. in 1907, one of the first advertising agencies in Detroit, which business he later sold to Brooke, Smith & French, Inc. He served as a major during the war and for two years after was manager of the Chicago branch of the Irving Bank & Columbia Trust Co. Mr. Chamberlin was associated with W. R. Wilson in the reorganization of the Maxwell Motor Corp., serving as assistant to A. E. Barker, then vice-president in charge of sales. Later he became director of districts and education for this company. More recently he served as general sales manager for the Haynes Automobile Co., which position he resigned to take up his duties with Oakland.

Brosseau Nominated as Director

A. J. Brosseau, president of Mack Trucks, Inc., and secretary of the National Automobile Chamber of Commerce, was one of eight new directors of the Chamber of Commerce of the United States, placed in nomination at the mid-year meeting of the Eastern Division of the Chamber in Washington. The election will be held at the next annual meeting of the chamber in Washington next spring.

TUNNEL HALVES JOINED

NEW YORK, Oct. 30—The last bit of rock separating the approaching borings of the north tunnel of the Hudson River vehicular tunnel was removed late yesterday. When completed this tunnel will afford an exit from New York into New Jersey and an entrance from New Jersey to Manhattan, thus doing away with the slow-moving ferries. It is expected that this tunnel will greatly facilitate traffic between the two States.

NASH GOES HUNTING; ADDS TO HIS MUSEUM

KENOSHA, WIS., Oct. 27—Charles W. Nash, president of the Nash Motors Co. and Ajax Motors Co., has returned from a two months' sojourn in the wilds of Canada with a wondrous collection of specimens of big game, which are being mounted for addition to his private museum. The trophies include the mountain goat (Oreamnos montanus), mountain sheep (Ovsi canadensis), caribou (Rangifer caribou), grizzly bear (Ursus horribilis), and moose (Alces Americanus).

Mr. Nash and party carried on the chase in the Cassiar district of British Columbia, a picturesque country with snow-capped mountains, deep canyons and green timberland abounding in big game. The start was made at Telegraph Creek, B. C., and it required nine days of trekking through the wilderness before the hunting grounds, the Muddy Lake region, was reached. Altogether the party spent 40 days and 40 nights in the wilds, and 24 days actually were devoted to hunting.

Indian Motorcycle Netted $280,934 in Fiscal Year

SPRINGFIELD, MASS., Oct. 28—Report to shareholders of the Indian Motorcycle Co., for the fiscal year ended Aug. 31, read at the annual meeting, showed a net income of $280,934 before depreciation, maintenance and taxation. The president's report said that, while sales for the first six months were satisfactory, spring sales did not show a normal seasonal increase.

The company holds 2836 preferred shares and 6836 common shares of the capital stock of the Wire Wheel Corp. of America. An additional reserve has been set out of surplus so that these shares are carried at current market value, and there has been set out of surplus a reserve of $100,000 against the book value of the drop forging plant of the Harley Co., taken by mortgage foreclosure.

The company has bought 5000 shares of its common stock for resale at cost to members of its managerial staff. The ratio of current assets to current liabilities is given as 9 to 1, as against 7 to 1 a year ago.

Frank J. Weschler was re-elected president along with the entire list of officers and directors.

Cromwell-Dodge Plans to Reach Wider Fields

NEW YORK, Oct. 30—The Cromwell-Dodge Co., Inc., which finances dealers in Dodge Brothers cars, is planning to expand into a wider field as soon as the business can be accommodated in safety. At present it is covering the territory from Maine to Ohio and West Virginia, confining its operations solely to Dodge Brothers dealers.

The company is a closed corporation in a sense. Owned and controlled by the Dodge families, eligibility to own stock is restricted to members of the Dodge families, Dodge Brothers dealers and executives of Dodge Brothers. It is cooperative and profit-sharing.

Officers are J. H. R. Cromwell, president; Horace E. Dodge, vice-president, and Fred A. Weber, Jr., treasurer. Directors in addition to the officers are: S. S. Thornton, Thornton-Fuller Automobile Co., Philadelphia; H. A. Bonnell, Bonnell Motor Car Co., Newark, N. J.; Frank D. Saupp, Frank Saupp, Inc., Pittsburgh; W. A. Hall, attorney, New York City, and Henry Bross, Morgan, Lewis & Bockius, Philadelphia.

Exports Near Total of All of Last Year

Shipments of Automotive Products for Nine Months Are Valued at $166,667,971

WASHINGTON, Oct. 28—Exports of automotive products for the first nine months of 1924 are valued at $166,667,971, this figure closely approaching the total value of such exports for the entire year 1923, which was approximately $170,000,000.

September exports are valued at $16,251,566, a slight decrease from the figure for August. Shipments so far this year have fluctuated materially month by month, rising steadily from January to April, falling from May to July, rising again in August and once more receding very slightly in September. The figures are as follows: January, $18,465,202; February, $19,566,226; March, $21,226,273; April, $22,829,150; May, $20,966,227; June, $16,294,524; July, $14,758,142; August, $16,310,661; September, $16,251,566.

Production of cars and trucks in the United States and Canada increased during September, but exports were less than in August. Consequently the ratio of exports to production in September was 6.3 per cent, as compared with 6.5 per cent during August. Production was 288,008, as compared with 271,933 in August.

Assemblies of American cars and trucks in foreign countries are increased this month by the addition of figures from a large American producer. The sales in plants operated by this company at London and Copenhagen are included for the first time this month in the official figures. Reports from the same source have been secured for the entire year to date and incorporated in the assembly figures given in the table on this page.

Springfield Body Corp. Secures New Bond Issue

SPRINGFIELD, MASS., Oct. 28—A trust deed has been filed in the registry of deeds here by the Springfield Body Corp., transferring in trust to the Gotham National Bank, New York, as trustee, properties in Chicopee to secure a $1,000,000 issue of first mortgage, 20 year, 6 per cent sinking fund gold bonds.

The instrument declares that the corporation has acquired from Stevens-Duryea Motors, Inc., and has contracted to pay for the property in part by the execution and delivery of bonds to the amount of $525,000, secured by a purchase money sinking fund first mortgage on the property purchased. The bonds will mature in 20 years and bear interest at 6 per cent.

Exports, Imports and Reimports of the Automotive Industry for September of Current Year and Total for Nine Months Ending September 30, 1924.

	Month of September				Nine Months Ending September			
	1923		1924		1923		1924	
	No.	Value	No.	Value	No.	Value	No.	Value
EXPORTS								
Automobiles including chassis	11,691	$8,528,034	13,979	$10,744,198	113,344	$76,989,116	135,212	$9,773,128
Electric trucks and passenger cars	.....	.....	.....	.....	153	230,243	.....	.....
Motor buses and trucks, except electric:								
Up to 1 ton	876	432,443	803	422,568	13,768	4,966,596	9,463	4,127,714
Over 1 and up to 2½ tons	315	406,132	464	650,659	3,179	3,755,841	4,046	5,454,295
Over 2½ tons	34	103,889	213	484,670	609	1,453,409	1,207	2,902,802
Total motor trucks and buses except electric	1,225	942,464	2,306	1,859,027	17,556	10,175,846	20,980	14,838,786
PASSENGER CARS								
Passenger cars, except electric:								
Value up to $500 inclusive	3,318	1,154,647	4,757	1,739,953	41,627	14,737,948	45,367	16,498,634
Value up to $800	3,451	2,204,415	2,907	2,034,095	21,596	14,316,595	32,591	22,030,642
Value over $800 and up to $2000	3,517	3,712,050	3,734	4,375,828	30,367	31,901,588	33,564	36,974,195
Value over $2000	180	514,458	257	716,329	2,045	5,626,896	2,591	7,243,287
Total passenger cars except electric	10,466	7,585,570	11,655	8,866,205	95,635	66,583,027	114,113	82,746,758
PARTS, ETC.								
Parts, except engines and tires*								
Automobile unit assemblies*	1,166,326	189,657	346,181	87,106	22,897,581	3,627,339	9,664,628	2,139,861
Accessories and parts*	21,272,090	5,112,467	.....	.....	177,201,039	40,701,243	.....	.....
Automobile service appliances (not elsewhere specified)*	93,925	46,065	582,714	223,346	1,182,798	624,286	4,976,184	1,984,906
Station and warehouse motor trucks	26	9,206	25	6,197	152	74,242	117	74,908
Trailers	35	8,942	69	16,455	902	312,600	409	146,161
Airplanes	3	31,700	.....	.....	42	300,151	47	298,677
Parts of airplanes, except engines and tires*	91,751	2,703	29,249	14,673	231,280	37,203	155,897	156,524
BICYCLES, ETC.								
Bicycles and tricycles	2,121	22,889	582	14,759	20,768	169,900	5,125	129,263
Motorcycles	1,818	452,039	1,062	241,038	17,203	4,076,180	12,246	2,974,521
Parts, except tires*	165,917	103,734	190,688	105,847	2,459,336	1,260,914	2,239,500	1,210,647
INTERNAL COMBUSTION ENGINES								
Stationary and Portable:								
Diesel and Semi-Diesel	73	16,040	96	17,907	868	352,551	1,343	430,498
Other stationary and portable:								
Not over 8 H.P.	2,030	204,867	1,992	177,902	21,804	2,063,210	18,018	1,658,142
Over 8 H.P.	193	108,271	121	132,036	1,832	973,154	1,909	1,261,035
Automobile engines								
Motor trucks and buses	16	5,286	16	8,348	2,947	335,626	1,005	138,853
Passenger cars	2,318	392,457	936	195,747	31,326	3,908,997	15,876	2,527,336
Tractors	634	126,898	33	16,762	2,064	463,360	2,342	716,964
Aircraft	7	6,500	12	18,050	37	33,757	133	203,199
Accessories*	974,037	375,318	511,887	236,366	6,011,158	2,605,083	6,281,260	2,760,558
IMPORTS								
Automobiles and chassis (dutiable)	67	38,924	59	110,404	514	622,710	447	649,069
Other vehicles and parts for them (dutiable)	.....	137,105	.....	35,670	.....	1,500,272	.....	815,454
REIMPORTS								
Automobiles (free from duty)	52	89,806	91	182,208	2,133	2,406,918	374	505,152

* Pounds.

New Maybach Engine Made for Zeppelin

Will Be Used in Mammoth Dirigible to Be Built at Goodyear Plant in Akron

AKRON, Oct. 29—Motive power for the new 5,000,000 cu. ft. capacity Zeppelin, working plans for which have been started at the plant here of the Goodyear Tire & Rubber Co., probably will be furnished by a new, high speed, heavy oil engine, according to Capt. Ernst A. Lehmann, vice-president of the Goodyear Zeppelin Corp. This engine is now receiving its final tests in the Maybach Motor Works in Germany.

Captain Lehmann predicts that such ships as Goodyear now is designing, equipped with Maybach engines and inflated with helium gas, will be carrying passengers around the world in the next few years in greater comfort and safety and with greater speed than is possible for the greatest ocean liners.

Karl Maybach's new Diesel engine is described by the Zeppelin expert as being the greatest improvement offered the lighter-than-air craft industry since the war. Arrangements are to be made whereby the Goodyear company will be permitted to use these engines in the ships it is to build.

Following the successful termination of the flight of the ZR-3 from Germany to America, Goodyear officials decided to go ahead at once with plans for a huge passenger air liner. The ship will be twice as large as the ZR-3, being more than 1000 feet in length. The cost is estimated to be in the neighborhood of $3,000,000. Dr. Karl Arnstein, chief of design of the German-Zeppelin Corporation, is coming here early next month with a staff of twelve Zeppelin experts to supervise work on the big ship.

Goodyear now is building one semi-rigid and six non-rigid airships for the U. S. Army. Several of these will be completed early next year.

A reception in honor of Dr. Hugo Eckener, commander of the ZR-3, and other Zeppelin officers will be given here tonight at the City Club.

Olds Now Concentrates on Making Coach Model

DETROIT, Oct. 28—Four out of every five cars made by the Olds Motor Works for the next three months will be coach models, according to a factory statement. It is said that demand for this model has been extreme since its recent announcement, and the company is speeding up its body output as rapidly as possible in an effort to keep up with requirements from dealers.

Factory schedules for the months of November, December and January are understood to call for approximately 3500 cars a month, of which the coach will represent from 2400 to 2800 of each month's output. Additional facilities are being set up in the Fisher body plant, adjoining the factory, and several hundred workmen have been added within the last two weeks in an effort to bring the production of this body type up to the total required.

In the first 20 days after its announcement, the factory built and shipped 1540 coach models. Since these have arrived in dealers' hands the factory has been in receipt of a continuous demand for additional shipments.

SAFETY CONFERENCE DATED FOR DECEMBER

WASHINGTON, Oct. 30—Preliminary surveys and studies having been completed by eight major committees, Secretary Hoover has issued a call for a national conference on street and highway safety, to be held here on Dec. 15, 16 and 17.

The need for such a meeting is reflected in the fact, the Secretary points out, that 22,600 people were killed outright, 678,000 injured and $600,000,000 damage was done to the property in 1923 on the national highways in traffic accidents, 85 per cent of which were due to automobiles.

S. C. Johnson & Son Co. Will Enlarge Factory

RACINE, WIS., Oct. 27—Another large factory addition is being built to the main plant of the S. C. Johnson & Son Co., widely known in the automotive industries for its waxes, polishes, varnishes, finishes and chemical specialties. The latest extension will be equipped principally as one of the finest industrial laboratories in the country, with three distinct divisions—analytical, research and raw material testing.

It will be ready about March 15 or April 1. The growth of the varnish division also will be accommodated in the building, which will be 80 x 100 ft., two stories. In addition to the Racine factory, the Johnson company maintains a Canadian factory at Brantford, another in England and still another in Australia.

ROY ELMER MULL DEAD

INDIANAPOLIS, Oct. 27—Roy Elmer Mull, general sales manager of the C. H. Wallerich Co., Dodge Brothers distributor here, is dead after a five weeks' illness. Starting in the industry in 1907, Mr. Mull held executive positions with the Overland, Haynes, Marion and Maxwell, becoming director of service for the export department of the Willys-Overland Co. Following a trip around the world for Overland in 1920, he joined the Wallerich company staff here.

Latest Marmon Model Has 10 Body Styles

Prices of Closed Types Are Only $135 More Than Those for the Open Car

INDIANAPOLIS, Oct. 27—A new model known as the 74 will be announced by the Nordyke & Marmon Co. on Nov. 1. Generally speaking, the design is the same as that of last year's model, but numerous changes have been made in both the chassis and the body.

Ten body styles are being offered with the new line. The prices of the three open models, roadster, phaeton and touring car, are the same, viz.: $3,165. Of the closed models the two lowest-priced, the sedan and a four-door brougham-coupe, are only $135 more than the open models, listing at $3,295. Other closed models are as follows: Coupe de luxe, $3,455; five-passenger sedan de luxe, $3,775; five-passenger sedan-limousine de luxe, $3,900; seven-passenger sedan de luxe, $3,850; seven-passenger sedan-limousine de luxe, $3,975.

Duco finish is now standard on all models; balloon tires are regular equipment; double molding is now used on the belt line of all bodies, and a sun visor forms an extension of the top line of all closed bodies.

Among the mechanical changes may be mentioned improvements in the valve mechanism, the intake manifold construction, the clutch and the steering gear. An illustrated description of the new model will be published in AUTOMOTIVE INDUSTRIES in an early issue.

Ford Sales Made in U. S. Total 1,500,905 So Far

DETROIT, Oct. 27—Total sales of Ford cars and trucks in the United States of 1,500,905 exceed all previous three-quarter year periods, and represent an 11 per cent increase over the 1,353,918 total for the corresponding nine months of last year. Stocks of cars in dealers' hands now are lower than at any time since November, 1923, due to the fact that sales volume in this period has exceeded the production total.

Production during the first nine months of the year totaled 1,412,930, which is 87,975 under the sales total. For the same period a year ago the production total of 1,398,432 exceeded the sales total of 1,353,918 by 44,514.

There are now 9609 authorized Ford sales and service dealers in the United States, and these are supplemented by 28,014 service stations, an increase of 6955 in the last year. The service dealers are distinct from the sales and service dealers, but are advised and supplied with parts by the latter.

Lincoln sales in the first nine months of the year totaled 5858, which is a 25 per cent gain over the same period in 1923.

Larger Sales Made of Farm Equipment

Purchases Reflect Better Conditions Existing in Agricultural Districts

CHICAGO, Oct. 25—Decided improvement of merchandising conditions in the farm equipment business, the basic reason for which is of interest to the automotive industry, was indicated by reports, speeches and private discussions at the annual convention here this week of the National Association of Farm Equipment Manufacturers.

The basic reason for this improvement in merchandising is the increase in prices of farm products, and since figures compiled by the association show that nine cents out of every dollar the farmer spends goes for purchase and upkeep of automobiles, the significance to the automotive industry is evident.

Era Just Beginning

Of still further significance is the fact brought out by speakers that the era of power farming is only in its beginning, and that the next few years will see a tremendous development of farm machines operated by internal combustion engines.

Prosperity for the farmers, which has been approaching for several months, is certain to grow and spread and to continue over a long term of years, according to James R. Howard, former president of the American Farm Bureau Federation, himself a large land owner and farmer in Iowa, and now president of the statistical corporation whose function is the collection and dissemination of agricultural information.

The improvement in farm prices is already being reflected in greater sales of farm implements, according to various reports made to the convention. One significant fact is the return to membership in the association of a number of firms which in the last year dropped out because of financial difficulties. In the year ending Oct. 1 the association had suffered a net loss of 20 per cent of its membership, but since that time a substantial part of those that withdrew have returned to membership. The whole industry was said to be feeling the effects of the recent upward trend of prices of agricultural products.

Relation to Industry

A definite relation between the automotive industry and the farm equipment business was seen by G. A. Ranney, vice-president of the International Harvester Co., who was one of the speakers. Mr. Ranney, admitting that the buying of automobile and trucks by farmers had always been in the lead of the buying of tractors and other power farming equipment, declared that he believed this has led to a more rapid adoption of power equipment than would have taken place otherwise. The education the farmer gets in the use of internal combustion engines through the use of automobiles makes it easy for him to turn to tractors and trucks, Mr. Ranney said.

The era of power farming has only just started, Mr. Ranney said, and he predicted that within a few years the old farm wagon will have practically disappeared from the highways. He said there will also be great development in other power farm equipment.

FINANCIAL NOTES

Pierce-Arrow Motor Car Co.'s report for the third quarter shows a net income, after interest, depreciation, etc., of $137,281. This is equivalent tax after allowing for dividends on prior preference stock, to $1.05 a share on the $10,000,000 of 8 per cent cumulative preferred stock. It compares with $138,144, or $1.06 a share on the preferred in the preceding quarter, and $41,178, or nine cents on the preferred in the third quarter of 1923. For the nine months the net income totaled $354,154 as compared with $309,089 in the same period last year.

Spicer Manufacturing Corp. reports a third quarter net income of $193,397, after charges, as compared with $213,736 in the corresponding period last year. This is equivalent to 35 cents a share on 313,750 no par value common shares outstanding after deducting estimated Federal taxes and preferred dividends. For the nine months net profits totaled $897,040 or $1.92 a share on the common, compared with $1,244,698 or $2.89 a share in the corresponding period of 1923.

Wright Aeronautical Corp. in the third quarter made net profits of $136,000 compared with $126,000 in the same quarter in 1923. Net profits for the nine months were $313,000, against $277,000 in the same period in 1923.

Hall Lamp Co. has declared a dividend of 25 cents a share on the 200,000 shares of no par value stock, payable Nov. 15 to stock of record Nov. 10. This makes a total of $2 paid for the year.

Gray & Davis, Inc., reports a net loss of $45,986 after depreciation, etc., for the first nine months of the year. After deducting $45,000 for preferred dividends there was a deficit of $90,986.

H. H. Franklin Manufacturing Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred, payable Nov. 1 to stockholders of record Oct. 20.

C. G. Spring & Bumper Co. has declared a dividend of 5 cents a share on common stock of record Nov. 7, payable Nov. 15.

Count Louis Zborowski Meets Death at Milan

NEW YORK, Oct. 27—Count Louis Zborowski, killed in the race on the speedway at Milan, Italy, Oct. 19, was a grandson of Mary Alice Astor, grand daughter of the first John Jacob Astor. He left an estate in this country which is valued at more than $1,000,000, which will be distributed among relatives and friends. This fact was brought out last week through the filing of his will for probate in this country.

The count met death on the race track as did his father before him. He raced in the 500-mile event at Indianapolis in 1923, piloting a Bugatti, which lasted 41 laps, being put out by a broken connecting rod. Following this the count purchased a Miller Special, which he took back with him to Europe. He also was instrumental in getting the late Jimmy Murphy to return with him and participate in several Italian races.

Industry Pays Third of Taxes Collected

September Returns Show That $11,712,055 Was Paid on Automotive Products

WASHINGTON, Oct. 29—A total of $11,712,055 in excise taxes was collected from the automotive industry during September, according to figures of the Internal Revenue Bureau.

Comparing this figure with the same month of last year, the current month's collection was $1,134,950 less than the tax collected in September of last year. The decrease this September over last is accounted for largely by the fact that many items which were taxable last year have been reclassified and are not now listed as "luxuries."

Total excise taxes for the first nine months of this year, collected from the automotive industry, amounts to $32,462,661, compared with $39,968,367 collected the first nine months of last year.

Comparing the excise tax collected from the automotive industry with that collected from other industries, the figures show that for the month of September approximately one-third of the total tax, which amounted to $35,293,542, was collected from the automotive industry. The special stamp tax on tobacco, amounting to $29,672,821, is the largest single source of revenue to the Government, exclusive of the excise taxes. The aggregate Federal receipts, from all sources for September were $423,449,693.

Of the September, 1924, automobile taxes, $545,096 was collected on automobile trucks and "automobile wagons," compared with $851,657 collected on the same items in September, 1923. Passenger car and motorcycle taxes in September, 1924, aggregated $9,278,014, compared with $9,209,346 in September, 1923, while the tax on parts and accessories was $1,888,944, compared with $2,786,002 in September, 1923.

French Would Recognize Contest Board of A. A. A.

PARIS, Oct. 18 (*by mail*)—That the Contest Board of the American Automobile Association ought to be recognized by Europe as the sporting authority in the United States, is the contention put forth by French writers in discussing the reframing of racing rules. It is pointed out that it is foolish to continue ignoring American records because they have not been submitted for approval by the European Federation of Automobile Clubs.

Years ago the Automobile Club of America was recognized in Europe as the national racing body of the United States, and the European Federation of Clubs has always declined to recognize the A. A. A.

National Show Space Is Already Oversold

Heavy Demand for Room at New York and Chicago Attributed to Trade Days

NEW YORK, Oct. 27—Both the New York and Chicago national shows are oversold, each having a waiting list of car and accessory manufacturers anxious for space in the big exhibitions. Due credit for this is given to the trade days preceding the throwing open of the doors to the public. Because of this feature there has been a rush on the part of the equipment makers for space which has more than made up for the falling off in the number of car makers exhibiting.

Allotment of space to the equipment exhibitors was completed last week, when it was found that after all the space had been assigned, there were 35 concerns which had to go on the New York waiting list and 10 at Chicago. Two car makers and two taxicab concerns also are on the waiting list.

The efforts of the Motor and Accessory Manufacturers Association have stirred up the members of that organization, and as a result the M. A. M. A. has taken 3500 sq. ft. more space at each of the shows than it did last year. Many of the M. A. M. A. members who were not in last year have returned, and in most cases they have taken two, three and four spaces for display purposes.

It is likely that those on the waiting list at Chicago will be cared for, because General Manager S. A. Miles has about decided to add the Grier Building at the south end of the Coliseum to his show group, which would be sufficient to care for the overflow.

First Charlotte Race Won by Tommy Milton

CHARLOTTE, N. C., Oct. 27—Tommy Milton, driving a Miller Special, won the 250-mile race Saturday which marked the opening of the new Charlotte board speedway. Milton covered the distance in 2:06:56.09, with Earl Cooper in a Studebaker Special second in 2:08:26.68.

At first Cooper was acclaimed winner of the inaugural event, but a recheck of the score sheets gave the honors to Milton, who drove a heady race all the way. Cooper himself was surprised at the first announcement, which was unofficial, that he had won, for he knew he was behind Milton and could not understand how the mistake could have been made.

The race was a fast one in which four new records were set up. Milton's average for the 250 miles was 118.17 m.p.h., while Cooper's first 50 miles was at 120 m.p.h., also a record. Peter De Paolo, in a Duesenberg, traveled three consecutive laps at an average speed of 125.7 m.p.h., while the fourth record came when four of the drivers finished within seven seconds of second place.

The official finish was as follows:

Pos.	Driver and Car	Time
1.	Tommy Milton, Miller Special.	2:06:56.09
2.	Earl Cooper, Studebaker Spl...	2:08:26.68
3.	Bennett Hill, Miller Special...	2:08:30.09
4.	P. De Paolo, Duesenberg Spl...	2:08:31.30
5.	Harry Hartz, Durant Special..	2:08:34.38
6.	J. Wonderlich, Durant Special.	2:09:21.21
7.	Phil Shafer, Duesenberg Spl...	2:10:36.71
8.	Fred Comer, Durant Special...	2:11:13.54
9.	R. McDonough, Miller Special.	2:11:25.81

It is estimated that 27,000 people watched the opening of the new speedway.

METAL MARKETS

Steel market conditions are becoming more orderly. The smaller independents catering to automotive consumers are beginning to realize that abolition of the Pittsburgh plus base has temporarily dislocated the price structure of the entire industry, not merely their own business. Judge E. H. Gary's remark at the opening of the American Iron and Steel Institute's meeting that "the future success of the iron and steel industry in this country is assured if the managers will keep their heads," has had the desired effect.

The industry has not yet adjusted itself to the new conditions, but it is on the high road toward that goal. Total or partial absorption of freight rates by the producer gives sales managers a certain amount of leeway in judging each inquiry upon its own merits and quoting accordingly. Stripping prevailing quotations of freight considerations, the remaining mill prices do not show so much disparity as is generally supposed. Bars are somewhat irregular and automotive purchasing agents find quite a spread between cold-finished steel bar prices of different producers as the result of the irregularity of the hot-rolled raw material.

Sheets, however, especially full-finished automobile sheets, are quite steady. The strip steel market is also fairly regular, and, compared with other commodities, the demand for strip steel, due to automotive buying, is keeping up remarkably well. In the Youngstown district there has been a drop of 10 per cent in the rate of sheet mill operations which are now at about two-thirds of total capacity. The hand-to-mouth buying in vogue has its compensating features. Producers had reconciled themselves to a sharp falling off in demand immediately preceding Election Day, but they were gratefully disappointed in this because consumers had been buying only what steel they needed, and so had to keep on buying to cover their current requirements.

If the steel market runs according to established form, very little change in the general price situation will take place until the approach of the New Year when, if first-quarter 1925 demand shows signs of being heavy, prices will naturally harden. Should indications point toward light demand in the opening months of the new year, the market will be correspondingly flabby.

Pig Iron.—There is a sharp contrast in price views of blast furnace interests between single car shipments of foundry and malleable iron wanted for nearby consumption and deferred delivery contracts. Producers are talking higher prices than the $19.50 to $20, Valley, range now in vogue, but whether consumers will accede to these remains to be seen.

Aluminum.—The domestic market is quiet and steady. The political notoriety for which the American aluminum industry came in during the campaign is, of course, without effect on the market, and those who hope that it still will be are indulging in false fancies. It is interesting to note that German automotive consumers are complaining of the high home prices of ingots as well as sheets and circles. The European aluminum price convention covers ingots but not rolled products.

Copper.—The red metal recently made some notable gains both in domestic demand as well as price. Automotive brasses are being bought in a routine way.

Lead.—Consumers, especially automotive storage battery manufacturers, await a reaction from the recently prevailing high levels before covering more than urgent requirements.

Committee Discusses Steel Gage Progress

Bureau of Standards Representatives Consider Advancement Made in Tests

BOSTON, Oct. 26—A meeting of the Gage Steel Committee of the Bureau of Standards was held at the Copley Plaza last Thursday, at which the most recent progress in the tests on gage steels was discussed.

From the Eleventh Progress Report of the Committee, recently issued, the conclusions were drawn that carbon tool steel gives better wear resistance than oil-hardened, chrome-bearing steel, and that soft gages do not necessarily have less wear resistance than hard ones, but because of the scratching of the soft gages the opinion is formed that their wear is greater. The scratches are spread into other scratches and so accelerate the wear. Results obtained by one concern showed that as long as the surface was smooth the wear was not rapid, but it became so when the surface was scratched.

Tests by Six Companies

Six concerns have been making wear tests on gages, all of them in the automotive industry, namely, White, Ford, Dodge Brothers, Willys-Overland, Chevrolet and Cadillac, and it was pointed out that the gages had been sent out to these manufacturers at a time when production in the automotive industry was very low.

In regard to the relative wear resistance of stellite and steel gages, it was pointed out that some service tests had been made by the Bureau of Standards, and it was found that the stellite gages (of No. 2 composition) had at least twice the life of steel gages of the particular kind used in the shop in which the tests were made. Stellite gages are included in the present service tests in order to get a comparison of stellite and steel of particular composition and treatment.

Discuss Recovering

The proposed method of recovering worn gages by chromium plating was discussed, and Major Johnson of the War Department suggested that work on this subject be set aside for the present. Dr. Gillett of the Bureau of Standards pointed out that if a good adherence between the gage and the chromium can be obtained, two problems, those of wear resistance and permanence, are solved at once. Chairman B. H. Blood of Hartford thought the method of reclaiming would hardly be economical, for the reason that the great expense in gage making is occasioned by the removal of the last thousandth of an inch.

The next meeting of the committee will take place in New York during the week of the A. M. S. E. convention in December.

Calendar

SHOWS

Nov. 9-15—New York, Annual Automobile Salon, Commodore Hotel.

Nov. 9-19—Buenos Aires, Annual Automobile Show, Pabellon de las Rosas, under the auspices of the Automovil Club Argentino.

Nov. 10-15 — Chicago, Annual Show and Convention of the Automotive Equipment Association, Coliseum.

Dec. 1-13—Montevideo, Uruguay —Second Annual Motor Show, under the auspices of the Centro Automovilista del Uruguay, held in buildings of the Asociacion Rural del Uruguay.

Dec. 5-14—Berlin Automobile Show.

Jan. 2-10—New York, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Bronx Armory. Open to the public except on Jan. 2 and 3 which are trade days.

Jan. 23-31 — Chicago, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory. Open to the public except on Jan. 23 and 24 which are trade days.

Jan. 25-31 — Chicago, Annual Automobile Salon.

RACES

Nov. 24—Los Angeles.

CONVENTIONS

Nov. 6-8—Chicago, First Convention of the National Standard Parts Association, Hotel La Salle.

Nov. 10-15 — Chicago, Annual Convention and Show of the Automotive Equipment Association, Coliseum.

Nov. 16-22—Chicago, Transportation Show, under the auspices of the Motor Truck Industries, American Exposition Palace.

Nov. 18-19—Joint Service Meeting of the S. A. E. with the N. A. C. C. Cleveland, Hotel Winton.

Nov. 18-20—Akron, Ohio, Annual Convention of the National Tire Dealers Association.

Nov. 19—Annual Meeting, Motor Truck Industries, Inc., Detroit.

Jan. 5—New York, Convention under the auspices of the National Automobile Dealers Association, Hotel Commodore.

Jan. 5-9—Chicago, Road Show and Convention of the American Road Builders Association.

Jan. 26-29—Chicago, Eighth Annual Convention of the National Automobile Dealers Association, Hotel LaSalle.

S. A. E. MEETINGS

Nov.—Indiana Section, Talk by H. A. Huebotter of the Engineering Experiment Station of Purdue University.

Nov. 14—Washington Section, Air Cleaners in Motor Performance, L. I. Dollinger, Staynew Filter Corp.

Dec. 11—Indiana Section, Aviation Development, Major E. L. Hoffman; Superchargers, Dr. F. A. Moss.

Dec. 15—Cleveland Section, Development of Clutches, Ernest C. Wemp, Long Manufacturing Co., Old Colony Club, Hotel Cleveland.

Jan. 15—Indiana Section, Lubrication and Crank Case Dilution, W. S. Sparrow of the U. S. Bureau of Standards.

Jan. 19—Cleveland Section, Preparation of Fuel Charges and Detonation, Arthur H. Denison, Weger Motor Co., Old Colony Club, Hotel Cleveland.

Jan. 20-23 — S. A. E. Annual Meeting, Detroit.

Feb.—Indiana Section, Automobile Finishes.

Feb. 16—Cleveland Section, Electrical Instruments and Measuring of Chassis Tests by Means of Them, J. H. Hunt, General Motors Research Corp., Old Colony Club, Hotel Cleveland.

Mar.—Indiana Section, Developments in Transmission.

Mar. 16—Cleveland Section, Road and Riding Ability, Harry Horning, Waukesha Motor Co., Old Colony Club, Hotel Cleveland.

Apr. 9—Indiana Section, Talk by F. E. Hunt, vice-president of the General Motors Research Corp.

Graham Makes Truck Appeal to Shippers

NEW YORK, Oct. 29—Addressing the Traffic Club at the Waldorf-Astoria, George M. Graham, chairman of the Traffic Planning and Safety Committee of the National Automobile Chamber of Commerce, told the railroad men and shippers that they will make more profits and give the public better service through the use of truck units.

"Marked progress in the methods of handling shipments has been made during the past ten years," said Mr. Graham. "The shift in population in our cities from 40 per cent in 1900 to 51.4 per cent in 1920 has called for a reorganization of shipping facilities, with particular need for big local terminal operations."

Continuing, Mr. Graham said:

The rail men in the face of great obstacles have been meeting this situation effectively. Fortunately, the development of the motor vehicle has come about in this period, providing rapid transportation in the short haul local field. In 1914 the country was absorbing 25,000 motor trucks a year and today about 400,000 new trucks are being purchased annually.

This new development means better service for the public and more profits for the railroads which are engaging in truck operations. From the public viewpoint the carrying of goods promptly from the railroad terminal by motor truck means a great saving of time. From the rail viewpoint the truck provides an economical means of carrying goods in l.c.l. lots over short hauls.

Hanch Speaks on Traffic Relief

INDIANAPOLIS, Oct. 27 — C. C. Hanch, second vice-president of the National Automobile Chamber of Commerce, spoke before the Kiwanis Club in this city, urging commissions as a short cut to traffic relief. Too many prohibitions, he said, are the chief causes of traffic difficulties.

Continuing, he said:

Our cities are placing the chief burden of traffic on our already overworked police force instead of making studies of transportation needs and planning traffic routing and improvements on the basis of these studies.

Every large city needs a traffic commission which will study its railroad, electric and motor vehicle facilities and map out plans of operation which will give fair treatment to all on the basis of maximum efficiency and service.

The opening up of a few streets in many cities and the economic routing of commercial vehicle traffic will be helpful both to shipper and public.

Speed is a relative matter depending upon the time of day, the place and the conditions of road and weather. What we need most is not the clamping down of an arbitrary speed law but the quick and safe dispatching of traffic at rates of speed suitable to the conditions.

We need more parking, not "no parking." Facilities at cost should be provided for the all-day parker, and everyone should be permitted to leave his car at a given place long enough to attend to reasonable errands.

Texas Railroads Favor Taxing Bus and Truck

AUSTIN, TEX., Oct. 28—Motor bus passenger lines and motor truck freight lines are to be declared common carriers and a special tax levied against them, if the legislature at its coming regular session acts favorably upon the recommendation which is to be made by F. Yantis Robnett, secretary of the State highway commission.

It is stated that the proposition of taxing motor buses and motor trucks and also of fixing their schedule rates will be urged by the railroads of the State.

Railroads Augment Number of Box Cars

DETROIT, Oct. 25—At the monthly meeting of freight traffic managers, members of the National Automobile Chamber of Commerce, L. N. Betts of the car service division, American Railway Association, outlined the operation of car service rules in force on railroads throughout the country, with particular reference to the effect on automobile cars.

The automobile industry is one of the heaviest users of railroad equipment, its shipments approximating 450,000 carloads of automobiles a year. It developed that 125,000 box cars with wide doors, suitable for automobile loading, are now in service. Cars of this type have been found highly desirable for other kinds of freight as well. The number is being constantly increased and is expected to reach 143,000 when current orders are filled.

George F. Bauer, secretary of the N. A. C. C. Foreign Trade Committee, reported on interviews with officers of Mexican railways during his recent trip to Mexico City. An effort is to be made to adjust the minimum carload weight charged by railroads in Mexico on automobiles shipped to that country to conform with the minima charged by American railroads. At the present time the basic Mexican minimum is double the American minima.

A special committee consisting of H. Deuster, chairman; W. J. Bailey, C. R. Scharff, P. G. Findlay and W. R. Short was appointed to study the revision of class rates in eastern territory which the railroads are about to submit to the Interstate Commerce Commission and which will vitally affect the automobile industry.